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SPADE-CRAFT

SPADE-CRAFT

OR HOW TO BE A GARDENER

BY

HARRY A. DAY

F.R.H.S.

Cursed is the ground . . . thorns also and thistles shall it bring forth to thee . . . in the sweat of thy face shalt thou eat bread."—Gen. iii. 17, 18 19

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P R E F A C E

IN this book I endeavour to portray the practical powers of the garden, and assist as far as I can towards the attainment and realization of a perfect and fruitful soil.

I should like this volume to resolve itself into a true gardener's guide, to go to the root of matters, to point out mistakes and their remedies; to elucidate in general the "whys" and "wherefores" of our gardens and the interesting and beautiful inhabitants thereof.

"Spade-Craft" is a highly suggestive title. It is a term which is significant of laying foundations—the preparation—the strenuous and possibly dirty work connected with the initiation of any scheme or enterprise. "Spade-craft" is never popular; and, where this is permissible, is usually shirked. But in gardening it is so much of an essential that it really constitutes the key to success; though the labour it entails induces a tendency to neglect it. "Spade-craft" lore is the theme of this book, and I hope it may be found sufficiently interesting to prove useful to every one who possesses a plot of ground capable of being turned into a garden of some description.

In some gardens one rarely sees anything beyond the ordinary bedding and herbaceous subjects, usually planted for effect only. To indulge in the joys of cutting flowers from such plants would spoil the scheme of colour and the symmetry of the formal beds and borders. This manner of gardening is commonly left to the contractor, or to the city man with a taste for "pottering"—generally on Sundays.

The latter individual usually puts his plants in the ground roots downwards, simply because he knows it should be so ; he prunes, clips and sprays, and empties tins of artificial manure upon the earth because others do these things, or because he has read in his favourite newspaper that such treatment is correct. But how often do you see this man with a hoe after a shower of rain ; or with a spade, digging deeply, in autumn and winter ?

With these thoughts in my mind I have put plainly and simply, before every one who possesses and loves a garden, the essentials—the things that matter—the fundamentals—of gardening, as well as the requirements and peculiarities of certain plant life.

The intention of this book, therefore, is not to supply a collection of minute details as to how to grow each class of plants from seed to maturity ; but the objects I have in view are, roughly, three-fold :

- (1) To indicate the constitution, disposition, habits, and other natural features of the plants, etc., under consideration ;
- (2) To deduce from these facts the kind of soil, temperature, degree of moisture, etc., that the plants should be accorded in this country ;
- (3) To add anything that I may have experienced or heard of that would help the reader to a better understanding of cultivation in general.

H. A. DAY

CONTENTS

	PAGE
PREFACE	v
CHAPTER I	
A PLEA FOR MODERATION AND STUDY	I
CHAPTER II	
SOIL MANIPULATION AND MANAGEMENT	4
Composition of Soil—Functions of Water and Air— Heavy Soils—Light Soils—Trenching—“Sick Soils”— Good Soils—A New Garden—Cultivating the Soil.	
CHAPTER III	
MANURING THE SOIL	II
Over-manuring—Cultivation <i>versus</i> Manure—Manuring Subsoils—The Application—Uses.	
CHAPTER IV	
MECHANICAL AGENTS	16
Road Scrapings—Ashes—Lime—Fibrous Material—Salt, Soot, and Sand.	

CHAPTER V

	PAGE
WATERING	21
Combating Drought—The “Mulch”—Hoeing—The Application.	

CHAPTER VI

DRAINAGE	23
Effects of Drainage—Makeshift Drainage—Ineffective Drains—An Illustration—Temperature of Soil—Drainage and Plant Food—Deep Digging.	

CHAPTER VII

SEEDS AND SEED-SOWING	27
Annuals—Spring and Autumn Sowing—Perennials—Biennials—Half-hardy Subjects—Sowing Seeds of Tender and Hothouse Plants—Harvesting and Storing Seeds—Raising Plants from Slowly-germinating Seeds.	

CHAPTER VIII

THE TREATMENT OF SEEDLINGS	36
From Open-air Sowings—In Frames—In Boxes, etc.—Transplanting—A Home-made Frame—Soils and Composts.	

CHAPTER IX

POTTING AND POT PLANTS	39
Potting—House Plants—Re-potting and Shifting—Specimen and Pot Plants—Window Gardening.	

CHAPTER X

THE GARDEN UNDER GLASS	44
The Unheated Greenhouse—The Heated Greenhouse or Stove—Frames, etc.	

CONTENTS

ix

CHAPTER XI

	PAGE
PROPAGATION	49
Cuttings—Slips—Pipings—Layers—Layering Carnations —Layering other Subjects—“Striking” in General.	

CHAPTER XII

THE CULTIVATION OF FLOWERS	53
Disposition and Planting—Management—The Planting of Tender Roots—Some Tender-rooted Plants—Deep- rooting Flowers—Fibrous, or Surface-rooting Flowers— Tuberous-rooted Flowers—Flowers from Bulbs—A Few Notes on Favourite Flowers—Edgings (Floral)—Native Flowers.	

CHAPTER XIII

CLIMBERS, SHRUBS, HEDGES, ETC.	67
Climbers—Foliage Plants—Ornamental Shrubs and Trees —Weeping Standards—Some flowering Plants—Hedges.	

CHAPTER XIV

THE ROCKERY	72
Ferns and the Fernery—Alpines and the Alpinery.	

CHAPTER XV

VEGETABLE CULTIVATION	78
Treatment of Soil—Potatoes—Onions—Tap-rooted Vegetables—Turnip-rooted Vegetables—Leguminous Vegetables—The Cabbage Family—Vegetables grown in Trenches—Vegetables under Glass—Tomatoes—The Cucumber Family	

CHAPTER XVI

SALADS AND HERBS	PAGE 101
Cultivation of Salads—Plants that may be used for Salads —The Herb Garden—A List of Herbs, and their Requirements.	

CHAPTER XVII

CULTIVATION OF FRUIT	106
Soils — Manures — Aspects — Planting — Pruning — Thinning—Gathering—Apples—Pears—Quinces—Medlars —Stone Fruit—Cherries—Gooseberries and Currants— Raspberries—Strawberries—Other Berries—Nuts—Fruits under Glass.	

CHAPTER XVIII

INSECTS, FUNGOID DISEASES, ETC.	119
Destruction of Insect Pests—Insecticides—Poultry as an Antidote to Insects—Weeds and Disease.	

CHAPTER XIX

WEEDS	123
Description and Habits of Weeds—The Mission of Weeds —Weed Seeds—The Eradication of Weeds.	

CHAPTER XX

LAWNS, PATHS, ETC.	128
The Use of Grass in the Garden—Bulbs in Grass—Grass Paths—Construction and Drainage of Paths—Weed Killers.	

INDEX	131
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CHAPTER I

A PLEA FOR MODERATION AND STUDY

I AM not talking so much to the man who specializes in one particular flower or vegetable for exhibition or other purposes, to the exclusion of all else, or who treats everything as of small account which is of but supplementary usefulness. I rather address the individual who, like myself, prefers things in mixture, who enjoys a garden containing "something of everything," a varied conglomeration of beauties and delights forming a perfect whole—a garden that produces a riot of perfume and colour outdoors, and also provides a surplus of decorative things for indoor embellishment. We can revel in, and be proud of, such a garden, and it is worth striving for, be it a large or small one.

To my mind there is one main principle which underlies all successful gardening operations, and that is—*moderation*. Excesses are usually fatal, whether they be of zeal, of energy, of food, of moisture—these all combining to make failure. Over-production, too, in some cases becomes detrimental: in vegetables, the larger the specimen the coarser it is found; with flowers, size often means loss of scent or of some other quality. To have an ideal garden, then, one requires moderation—a true balance of colours, scents, forms, and characters. Monstrosities, freaks, fasciated stems, and other not particularly desirable happenings in the garden may safely be reckoned as excesses of some kind. Every gardener, certainly,

desires to obtain the finest, prettiest, sweetest flowers, and the best-shaped, tenderest vegetables ; but it should be remembered that these things are acquired, not by an overplus of rich food—which, with plants as with humans, becomes nauseating—but by careful tillage, intelligent cultivation, and diligent study.

It should not be forgotten either that, while Nature is extremely elastic and accommodating, she has her limits ; and when attempts are made to force her past those limits the inevitable and only result is deterioration in some way or another. And deterioration means loss. Some gardens appear to be composed of very little else but manure, and even such gross-feeding subjects as Roses, Sweet Peas, etc., become satiated ; and in many of the failures recorded in such subjects too much food will be found to be the predisposing cause. These cases, indeed, resemble that of the greedy boy—an enormous appetite, an unlimited supply of food—and the unenviable but inevitable consequences !

The whole trouble often arises through the gardener's neglect to satisfy himself of the actual needs of his soil. The nurseryman, the seedsman, the gardening journals and books all tell him the needs of his plants ; he carries out their instructions to the letter, but does not always obtain corresponding results ; and the nurseryman and garden literature get the blame : whereas, if the soil received better attention the plants therein would be in a position to take care of themselves. It is really a question not so much of the treatment as of the manner in which the treatment is applied. There is a great difference, for example, between the speculative application of a manure, and the certainty that it is really needed.

Another thing that affects gardening is the gardener's available means. No man should undertake what he has not the requisite means at his disposal to carry out ; and after all instructions and methods described in garden literature should be read the words : “if you can afford the necessary material,” or “if you have the time at your disposal,”

A PLEA FOR MODERATION AND STUDY 8

or "if you will take the trouble to *understand* it thoroughly." The last, I consider, is the most important. That alone will ensure success, even with limited and crude accessories. In many cases intelligence and inventiveness make up for lack of material and money.

Thus the greatest factors in successful gardening are moderation and the spirit of study.

Avoid all extravagances, hurry, over-application of both energy and substances ; try to treat the garden and the plants therein in a natural, common-sense manner, with a view to their needs both in sustenance and appearance.

There is also great danger, not of the neglect of amateur gardeners to follow instructions available from various sources, but rather of their too punctilious heed of them. Some people transform directions and recipes into a sort of ritual, making no allowance for circumstances or situations. In the place of such a pedantic, particular, unyielding adherence to procedure, the amateur especially should bring his observation and reason into play, and remember that rules and regulations are for guidance, and not for slavish, blind execution. If the instructions for the growing of a certain plant indicate lime, or peat, or nitrates, or sand, it does not mean that the plant must be surfeited with that substance to the exclusion of all else ; it means that the plant requires such a substance in greater proportion than that in which other materials are given. It is the same in all departments : common sense must rule, and moderation combined with good judgment must be the gardener's steadfast aim.

CHAPTER II

SOIL MANIPULATION AND MANAGEMENT

WHEN by reason of removal, purchase, or other circumstance I take over a fresh garden, be it old or new, my first thought is, What sort and condition of soil have I to work in? I always put this consideration first, because on the condition and composition of the soil nearly everything depends. Situation, of course, means much; but one is usually the victim of circumstances where site is concerned. Fortunate is the individual who has free and extensive choice!

The soil of the earth is made up of minute particles, or grains, lying more or less loosely together. When the **Composition of Soil** particles are well separated—as, for instance, in sand—the soil is termed “light”; in “medium” and “heavy” soils the particles are more closely packed—so much so in the latter case that they are welded into an almost firm mass.

The spaces between the grains are filled either with air or water, and it is when these two elements are most evenly balanced that the soil may be regarded as a perfect one, so far as texture is concerned.

In light soils air prevails—the water either filters through quickly, or, coming more readily under the influence of the sun, is absorbed before it can penetrate very far. In heavy soils, on the other hand, the grains of earth lie so closely together that there is very little room or opportunity for air to enter. Water soaks into this kind of soil, and it becomes a sodden, sticky mass in winter, with a hard-

SOIL MANIPULATION AND MANAGEMENT 5

baked surface in summer: it must be broken up finely to admit abundance of air, and to allow of the ready escape of water.

To be of use to plant life, this underground air must be moist—neither wet nor dry. When rain falls—or the hose or watering-pot is used—the water dropping upon the surface of the ground should rapidly disappear below, where, slowly percolating through and between the grains of soil, it moistens the air in the spaces, besides dissolving all soluble chemical substances on its way. The moisture-laden air is charged with gases from the dissolving chemicals, forming an underground atmosphere, in a manner like to the air we breathe above ground. This atmosphere forms the food-sources of the plants, whose roots wander amongst the soil-grains, extracting from the interstices the gaseous food compounds essential to their well-being, and revelling in their healthy, refreshingly moist surroundings. All this is most important, because plant-roots cannot absorb the food-chemicals in a solid state, however minute: all has to be in a state of solution—really in the form of gas or air.

A heavy soil is hard to deal with in more senses than one—some of the lumps incidental to such a soil defying all efforts at disintegration, either in a wet or dry state. The possessor of a heavy soil is unfortunate—so far as initial difficulty and hard work are concerned; but when that work is satisfactorily completed he has the best soil of all, for fertility, at any rate. Clay enters as a principal ingredient into the composition of most heavy soils, and clay is simply a storehouse of chemical food; it is to the art of extracting, liberating, and transforming this undissolved plant-food that the efforts of the gardener should be directed. When the ground is of a wet, sticky nature, trenching is almost impossible, and ordinary digging only scratches the surface, leaving an impenetrable mass below of no use except to the stronger-rooted vegetation.

The Functions of Water and Air

It is also useless to attempt digging at any time but the autumn and winter—never in spring or summer, as the result is only a collection of hard, unbreakable lumps. The application of mechanical agents is also of small use unless these are thoroughly mixed with the clay—and how can this be done unless the clay be disintegrated first? I refer to such agents as ashes, road-dust, organic manure, etc.

But there is a method of overcoming this cross-grained kind of soil, and one in which, after a little strenuous work, the gardener merely becomes an interested spectator, while the work is done for him! In late autumn, when the ground is perhaps in its happiest mood, the gardener must take a strong, wide-pronged fork—or pick-axe and crowbar if the ground is hard and unyielding—and force up the earth in rough lumps, and as deeply as possible. He must not attempt to break the lumps; but should leave them to the action of the elements—frost, snow, wind, rain, air. After the first frost a hammer or other suitable tool may be taken, and each lump given a smart tap. It is surprising the way those hitherto stodgy masses fall to pieces—pulverized as though passed through a grinding-mill! If the weather and state of soil permit, a crowbar or pick-axe may be brought to bear upon the under soil as well, exposing as much ground to the air as possible, and thus it may be left all the winter until spring. Even if the frost does not reach the under portion, it is at any rate roughly broken up, aerated to a certain extent, and partially dissolved by the action of snow, rain, and the atmosphere.

When the first fine weather shows itself in early spring, bring forth your road-dust, ashes, manure (old, well-rotted, and dry, or it will make the soil compact again), sand, and—last, not least, but the most valuable agent of all—lime. This ingredient will do more than all the others put together, because it not only disintegrates and disperses sour matter, but it also manures, disinfects, kills insects and harmful vegetable growth and seeds contained in the soil, and breaks up and liberates those valuable chemical compounds

SOIL MANIPULATION AND MANAGEMENT 7

that lie dormant and encased in the clay. Spread such materials over the surface of the ground and dig them well in—a comparatively easy matter now—mixing, pulverizing, as deeply and as thoroughly as possible.

This is the ideal practice with its consequent result—not always, however, a substantial fact, being of course limited by existing and local conditions. But, if persevered in, it is the best and safest way of treating hard soils ; in fact, it is the only way, if subsequent fertility and ease of working are taken into consideration and expected.

To those who feel disinclined to enter upon these strenuous and taxing operations, I would say that, if others are employed to do it, see that it *is* done. It will, moreover, pay for itself, whatever may be the expense entailed.

If the soil is light and porous—sandy, gritty, stony, or chalky—measures must be taken to alter its texture until it

Light Soils approaches a firmness and compactness, and loses its dry, dusty character. This is accomplished (1) by digging (always an essential) ; (2) by the application of such materials as stable manure, cow, pig, poultry, and other animal manures, loam, chopped turf, vegetable refuse, mud from ditches and ponds, sewerage—anything of a similar nature that the district produces, and that is available and cheap. The process consists in thoroughly mixing the manure, etc., with the sandy soil to as great a depth as is possible. This is best done by trenching.

Briefly, this operation is as follows : Take out a spadeful of earth, the whole width of the garden or plot, over about two or three square feet of the surface of the ground

Trenching (called “the top spit”), and cart it away to the other end of the garden. Then spread a layer of manure over the exposed subsoil (called “the second spit”), and upon that sprinkle liberally a quantity of lime—for preference—soot, or salt. Now dig this deeply into the subsoil, mixing thoroughly. This done, spread another layer of manure and lime over the next few feet of untouched surface soil (the top spit), and commence digging it out a spade deep, throwing

each spadeful upon the already dug subsoil in front, until another section of the subsoil is laid bare, which is to be treated in the same manner as the one just covered over with the excavated top or surface soil; repeat until the whole of the plot is dug, when the soil that was removed from the first trench will fill up the last trench, thus making all level. I will further explain: In effect, a wide trench is dug in this operation; the soil at the bottom of the trench is dug, pulverized, and mixed with the applied manure; then a similar trench is taken out of the next piece of ground, the excavated earth—mixed with manure—being thrown into the first trench.

Trenching will raise the soil perhaps to the extent of a foot; and if a stick be pushed down as far as it will go, it will be found to measure from two to three feet of well-manured, well-ventilated, well-drained soil.

A bad state of affairs is sometimes caused by over-feeding—a sort of earthy dyspepsia; and it is usually the condition of old gardens that have been manured “Sick” year after year, and have become so rich in food Soils elements as to be positively poisonous to vegetation. This can be remedied—and also prevented—by the liberal use of that most valuable corrective—lime.

The worth of any soil may be roughly tested, so far as its texture is concerned, by squeezing a portion tightly in the hand into the form of a ball. If, when the hand Good Soils is opened, the ball retains its shape, but falls to pieces on the slightest touch, the ground may be considered in a grand workable condition. On the other hand, should the soil feel sticky and squeeze into a solid mass, it is too heavy; if the soil will not bind, but runs through the fingers like powder, it is too light to be effective. This rough-and-ready test should be carried out after a shower of rain.

A good, well-drained soil will admit of a walking-stick being pushed down up to the handle. Such a depth of workable soil would be certain to be rich in food substances and moisture-retaining properties, and would require but little organic manure.

SOIL MANIPULATION AND MANAGEMENT 9

The soil of a new garden is not always an ideal one ; and neglect to correct its deficiencies is often attended with evil results in the shape of insect, weed, and fungus pests. Where the house is built upon grass land it is usual to dig the garden all over, a spade or so deep, leaving the turf to decay or dry up. This, of course, forms an excellent top soil, fibrous and easy of manipulation ; but it is nevertheless a deadly one, being full of the eggs and larvæ of insects, the insects themselves, and countless millions of weed seeds, only waiting a favourable moment to germinate.

If such a condition of things existed in a new garden placed under my care, I should feel inclined to sprinkle the turf thickly with lime, soot, and salt, and then trench the ground, turning the turf surface into and mixing well with the under spit, and letting the decaying and disintegrating process take place there. The next season this turf substance could be brought to the surface again—now a sweetened, somewhat sterilized, fibrous mould, such as garden flowers delight in. But this procedure has to be adapted to the requirements of the soil under the turf, which may be, for instance, clayey and sticky, and unworkable. In such a case, the liberal use of lime and soot, and several thorough surface diggings, should suffice for the first season, and in the winter the under soil could be broken up and exposed to the weather.

If the builder has left a legacy of broken bricks, mortar, etc., behind him, do not despise this rubbish. The broken bricks and slates will provide drainage where required, and also help to make a good foundation for the garden paths ; while the mortar, lime, sand, etc., will beneficially mix with the soil. Burn all wood, shavings, and articles of like nature, also weeds, twigs, etc., and dig the ashes into the soil.

Cultivation is a most important section of "spade-craft." It consists in deeply stirring the soil around growing plants to allow of the admittance of light, air, moisture and food. It can be accomplished by the fork, hand-fork, rake, pointed stick, or hoe—the last

being the best tool—and by the more modern “cultivator” for large areas.

The time spent in cultivating the soil is never wasted ; it pays almost better than anything else. It pays, in fact, far better than the everlasting “pottering”—equivalent to doing nothing—which so many would-be gardeners indulge in. Cultivation is more important than the picking off of a dead leaf here and there, or removing stones from flower-beds, or a complacent admiration of one’s flowers—“grown by my very own self ! ” To the earnest gardener the best advice I can give is: Get in amongst your plants with a tin of Clay’s Fertiliser, a watering-pot, and afterwards a hoe or fork, and observe the effect in a day or two ! Keep the soil “lively” amongst your vegetables, in your herbaceous borders, around your fruit trees. Don’t dig up and destroy roots, however ; rather, destroy weeds. Hoe and dig intelligently and gently and at every opportunity ; and you will be delighted with the result.

CHAPTER III

MANURING THE SOIL

NATURE has no missing links ; everything in her domain is in a state of adaptability, consecutiveness, and highly-balanced relationship. That being so, why should there be the necessity of applying large quantities of manure to land under cultivation ? Nature ought to provide a sufficiency of food for her plant-life without assistance, it may be argued ; and so she actually does. But it must be remembered that the vegetable, floral, and fruit products required by man are far ahead of those guaranteed by Nature—in size, vigour, colour, taste, and luxuriance—and that, whilst Nature provides adequate means for the sustenance of her ordinary productions, she requires assistance when forced beyond such usual confines. Therefore, the application of manure by the gardener becomes imperative.

Although manurial treatment is thus necessary, much more manure is generally applied to the soil than is really needed. If the cultivator would only draw upon the stores of food material which are naturally provided, a comparatively small quantity of manure would be required. This food material is locked up in the soil it is intended to fertilize, and requires liberation and chemical change before it becomes available as manure.

I hold that far more manure, both organic and artificial, is put into the ground—especially that devoted to flowers—

than the requirements of the soil warrant. Too often a certain chemical accredited to the development of certain plants is committed in large quantities to the soil containing these particular plants,

Over-
Manuring

whilst, at the same time, the earth holds a wealth of that very chemical, only waiting to be made available by manipulation of the ground.

My point is not that manure should *never* be applied at all, but that in many circumstances *too much* is used. The true view is that Nature supplies the bulk of food materials—a superabundance for her own modest requirements, in fact—while man must make up the deficiency entailed by the raising and production of higher-grade subjects.

If the fact could be ascertained by any means I believe that most gardens would prove to be over-manured. Inquiry would also show that over-manuring is the cause of many ills that gardeners have to contend with—the diseases, the mildews, the spots, the scabs, the blights ; manure is the breeding-ground of insects and injurious fungi, etc., and also encourages rank, flabby growth, weak constitution, and a susceptibility to insect and fungoid troubles and weather severity, under which the weaker plants are unable to withstand attacks of disease which would not affect those of a more sturdy growth.

Every intelligent cultivator will endeavour to become acquainted with the needs of his soil before rashly incorporating therewith loads of manure that are not required. The appearance of the soil often indicates its state (although not in every case), and even in doubtful situations moderation in manurial application will be found beneficial.

We are apt to judge wholly by the results that follow an action, rather than stop to inquire as to whether other means have not influenced those results.

Cultivation versus Manure For instance, it is perfectly natural to assume, when we apply manure to our soils, that the fine fruit, splendid foliage, and brilliant blossom are the direct results of that application. But it is only fair to ask, To what extent have digging and stirring the soil contributed to those results ? I am of opinion that this operation has quite as much bearing, if not more, upon the productiveness of the soil, as the actual manure has had. It

is shown elsewhere how digging and watering liberate and render available the chemical compounds contained in the soil, which would otherwise lie dormant and unused; and this fact emphasizes the value of the spade, fork, rake, hoe, and that excellent modern tool, the "cultivator," as manorial agents. Cultivation will be found to be as potent a factor as manure in many cases; in fact manure is of little use without cultivation.

One other important essential is the manuring of the subsoil. This is generally sadly neglected; but it is often the source

Manuring Subsoils of a fruitful garden. When rank manure is buried deeply in subsoils, it helps to keep them open, besides providing food for deep-rooting plants, this deep rooting being a characteristic of many flowers and vegetables. Here the manure may decay without doing harm to delicate surface roots by giving off huge quantities of strong, poisonous gases; and the next time the ground is dug it may be brought to the surface in excellent and modified condition, and of great fertilizing value. It is always best to avoid placing rank, crude, or powerful organic manures (such as poultry manure) in the "top spit" or surface soil.

Organic manure (animal, sewerage, etc.) should not be applied indiscriminately. The state and texture of the soil

The Application is, in many cases, a sufficient indication as to what manure is required, and traces of recent manuring are always evident. When using artificials, do not forget to make "a little and often" the golden rule. Just a pinch or a slight dusting—preferably during showery weather or at time of watering—is better and safer than a large dose at more distant intervals. Be careful that the manure does not go near enough to the plants to settle on the leaves or roots.

Manure water is made by placing a quantity of soot or sheep, poultry, horse, or cow manure, in a canvas bag, and immersing the bag in water until the liquid has turned a rich brown colour. When this change has taken place remove the bag, and water the ground around the plants with the

manure-impregnated liquid. If judged too strong, dilute with clear water. The ground should receive a first soaking with clear water; this facilitates the action of the manure which follows.

Artificials may be dissolved in water and thus applied; but if splashed on to the plants such chemically-charged water will certainly destroy them.

ARTIFICIAL (CHEMICAL) MANURES.—Nitrates are valuable stimulants, quick-acting, especially for leafy subjects—

The Uses of Different Manures Cabbages, Peas, Spinach, Onions, foliage plants, etc.; and used with discretion at the time of bud-development in flowers—such as Sweet Peas—

will be productive of longer stalks and stems, also making the foliage of a darker, richer green. Kainit is an all-round manure for vegetables. Basic slag will benefit leguminous subjects (Peas, Beans, etc.). Potash is required by most plants, and is especially useful for Potatoes and all stone fruit. Superphosphates are used for Tomatoes, Potatoes, especially, and a slight dusting of this fertilizer in the seed drills of all vegetables is very beneficial. Ammonia, too, is required by all plants, and is present in organic manures. Guano is a good, all-round, strong, and certain manure, especially for flowers.

Organic manures supply the foregoing chemical substances to the earth they are incorporated with, by decaying, and giving off strongly-charged gases during the decomposition. They are slower in action than the concentrated manures, but the gradual process is a natural one, and most beneficial in encouraging sturdy growth. Poultry, horse, and pig manures are strong in action, and suited to a heavy soil; whilst cow manure is useful for bringing light soils to a better consistency. Fish manures contain lime phosphates, and are highly fertilizing. Blood—liquid or dried—is a rich manure suited to Roses, fruit trees, Vines, and other vigorous, gross-feeding subjects. Bones and bone-meal are excellent fertilizers, the latter especially for pot plants, Turnips, and green stuff generally.

All organic manures have a mechanical effect upon soils. Fresh manure tightens the texture of the ground ; well-rotted, old manure disintegrates.

Lastly, there is the home-made fertilizer—in the shape of the garden rubbish heap.

Manures necessary for certain plants will be indicated whilst dealing with such subjects.

above ground ; these chemicals are released by the action of fire ; and by spreading the resulting ashes upon the ground and digging them in, the solid chemicals are restored to the soil, to be again dissolved, and absorbed by the succeeding roots.

An agent that cannot be spoken too highly of is lime. I doubt whether it is possible for any well-cropped land to

Lime be over-limed, so necessary is this substance to all plants. Yet it is comparatively little used. If gardens were well limed every two years, half the pests of the soil would disappear ; and by the use of lime tons of decomposing material can be profitably disposed of which otherwise would pollute the atmosphere and breed innumerable insects and fungoid diseases. There are several forms of lime.

In some soils the natural chalk and limestone supplies this constituent without artificial aid ; and in districts where chalk can be obtained it may be crushed and incorporated with the soil, and thus prove useful in many ways, especially on clay and plastic lands. Where the subsoil is chalk, it is a notorious fact that the soil above is often of very little depth. In such a case the hard chalk underneath should be well broken up with a pick-axe or crowbar. If this course is pursued habitually each year the chalk will become gradually disintegrated and mixed with the soil, thus creating a deeper medium. Such soils, too, need much organic manure.

The lime that is used for garden purposes may be obtained from builders, etc., unfortunately often in much larger quantities than desirable, and somewhat rough ; but there are firms that offer bushel bags of well-ground lime, which incorporates readily with the soil, and is much better than the more crude material. The gardener should always have a little lime at hand, for it is very useful, especially in keeping off insects from vegetable and flower seedlings. But the chief function of lime is that of a disintegrator. Nothing can ever take the place of lime for this purpose. The heaviest soil may be broken up with its aid. Lime should be applied in the autumn, spreading it thickly upon the surface of the ground, and

digging it into the soil in the spring. It is surprising the difference it makes in the texture of the soil, even in a short time.

Gas-lime is a substance obtainable from gas-works, and is used to sterilize vacant ground that may be infested with insects or weeds. Gas-lime kills *everything*, and the ground it is applied to cannot be used for cropping for quite six months afterwards. This drastic treatment becomes necessary on some lands.

Other uses for lime are: as a sweetener and purifier, to sprinkle upon decomposing material, manure, etc., to assist in its disintegration and prevent emanation of poisonous gases, especially when fresh manure is being applied to the land; also as a corrective where sourness, fungi, worms, etc., are present in the soil. Lime-water will drive worms out of lawns, and is fatal to many insect pests.

Fibre is an essential ingredient in all soils. The natural article is usually decayed turf, fibrous roots, leaves, and stalks.

Fibrous Material Other fibrous materials are peat, cocoanut fibre, decayed fern and other roots, moss, leaf-mould (coarse, unsifted), jadoo, etc. The function of fibre is chiefly to keep the soil open, free, and porous; yet it also helps to retain much moisture in assimilable and equable quantities. It is indispensable for potting purposes.

Salt, Soot, and Sand Salt is a most useful article in the garden. Its work in the soil consists in conserving moisture, killing insects and weeds, and as a general purifying agent. Salt should be put on the ground in autumn and winter, but not near growing vegetation. It is very beneficial in small quantities, however, on the surface around young plants, to prevent attacks by slugs, etc.; and a worm-infested soil or path can be freed from its encumbrance by a strong solution of brine being well soaked into it.

Soot, flue-dust, etc., are very valuable, and should be collected and stored for future use. Soot improves both light and heavy soils, clears the ground of insects, fungi, etc., and should always be dusted upon rank manure before being dug

in. The use of soot, of course, can be overdone ; but in fair quantities its effect is beneficial, imparting to the soil a rich, dark colour and softer texture. Both soot and flue-dust have an excellent manurial value also ; and a bag of soot immersed in water makes a capital liquid manure for general purposes.

Sand is an indispensable material for heavy soils. Besides this, its uses are legion : for potting, striking cuttings, seed-sowing, storing roots and bulbs, protection from frost—the gardener can never get the best results without plenty of sand. For breaking up clayey ground, especially that of sticky, plastic, sodden type, it is, in conjunction with lime and soot, most valuable. Sand, too, may be used with impunity at all seasons, as there is but little in it that will harm vegetation—except the rusty-red kind, which contains too much iron to be safe : this should be used for making paths (see Chapter XIX). Silver or white sand is the best for all purposes, either in large or fine grain ; and it can be bought cheaply of all nurserymen.

CHAPTER V WATERING

WATERING is a department of gardening much abused and but little understood. Many gallons of water are poured upon the parched earth every summer, which have little or no effect upon the well-being of the vegetation the water is intended to benefit, because the unfavourable condition of the land prohibits the plants from taking advantage of the moisture. Much of the water poured upon such land is in reality wasted—for the rapid evaporation in hot weather removes the moisture before the plants can avail themselves of its beneficial presence. These summer waterings are mere “refreshers”—useful, of course, but simply palliatives, which have no lasting effect upon the situation.

Now the surest and easiest method of securing a fair supply of moisture during seasons of drought is to make due provision before those seasons are in evidence ; and this is best accomplished by the deep digging, manuring, etc., described elsewhere in this book. As before stated, moist air, rather than abundance of water, is what all vegetation requires for its sustenance ; and only sufficient water to create this moist atmosphere is necessary—just enough moisture held in suspension in the soil to ensure this effect. In winter a greater amount of water falls upon the ground than is required to moisten thoroughly the soil, and this surplus water must be got rid of by draining. (See next chapter.) A good depth of loosely-lying soil brings this about perfectly. But in summer less rain falls, and the sun robs the surface soil of its moisture to a considerable distance. Yet there is much fluid stored up in the lower depths, and the roots of plants will go down after it. Thus in times of drought, when water is poured artificially upon the ground, it passes quickly into

the lower soil, out of reach of the absorbing influence of the dry air and hot sun.

I think this description should make it quite plain to every reader how much the state of the earth affects the provision of life-giving water for the uses of plants, and shew that it is not the quantity supplied, but the manner of its disposal and availability that ensures the greatest benefit.

But in hot weather moisture must be retained as near the surface as possible for the sustenance of surface-rooting plants. This is accomplished by "mulching"—i.e. spreading a layer of moisture-retaining materials, such as stable manure, cocoanut fibre, leaves, etc.—on the surface of the soil. Most of these substances are unsightly, however, and cocoanut fibre is the only respectable-looking material that can be used. But this is expensive when a large garden requires treatment. I find that horse-droppings collected from the roads make a very efficient mulch (if care is taken to pass the stuff through a sieve), placed thickly around the plants, and well watered down. An occasional potful of water afterwards will keep it in a moist condition. This is a simple, labour-saving mulch, and within the reach of everyone, whether countrygardenerorsuburbanite.

Another way to combat drought—especially in the vegetable quarters—is the frequent use of the hoe. After watering the hoe should be applied vigorously between the plants. This opening of the ground allows moisture to pass more rapidly out of reach of the absorbing rays of the hot sun; and although the surface of the ground may quickly assume the consistency of dust, yet this very dust forms a sort of screen between the moisture underneath and the sun above, while at the same time admitting air into the earth.

When applying water, do so thoroughly. Two applications in a week, given unstintingly, are far more effective than a mere sprinkle every evening—although as a "refresher" the sprinkling does much good. Perhaps it is as well to do the sprinkling each evening during very hot weather, but—do not omit the thorough drenching and systematic soaking at least once a week!

CHAPTER VI

DRAINAGE

DRAINING the soil of surplus water is a most important essential to the success and welfare of any garden, large or small; and the fact that it is partially, if not wholly, ignored in the majority of cases, causes me emphatically to call attention to this chapter, and to urge upon the gardener the importance of the operation of which it treats.

Briefly, the effects of drainage are: (1) the retention in the soil of moisture in sufficient quantity (not the entire subtraction of water—the sun, wind, and atmosphere will do that, without assistance, if required); (2) the raising of the temperature of the soil; (3) the altering and enriching of the texture of the soil; (4) the enhancing of the fertility of the soil; and (5) the substitution of atmospheric and chemically-charged air for water in the interstices of the soil.

Every soil is the better for some system of drainage, however crude—if effective. In small gardens a very deep hole dug in the lowest level thereof, and partially filled with branches of trees, broken bricks, clinkers, and any materials that will lie loosely together, will effect a very fair drainage; or a ditch, cut the whole length of the ground, will collect and drain off much of the water: but if the garden is the property of the occupier it will pay him to have a proper drain by means of pipes, constructed by competent workmen.

But one sometimes hears complaints of the ineffectiveness of drains; the land seems no better, and the water does not disappear from the surface with the rapidity to be expected.

In many cases the solution is simple: not the fault of the drainage system, but of the gardener. The latter individual, on seeing the work satisfactorily completed, has folded his arms and viewed the land complacently. "Now we have come to the end of our troubles!" he has remarked. But the first shower of heavy rain reveals to him the fact that all is not well. The contractor who placed the drains is blamed, but unjustly; for the gardener has forgotten the fact that the drains cannot quickly carry away water that does not quickly reach them. He has provided the drainage apparatus, but has failed to provide the drainage itself—i.e., he has neglected to open up the surface and sub-surface for the easy passage of water. He discovers that an elaborate drainage system is useless in a close-grained soil; and the only way to remedy matters is to dig, open up, pulverize—then the water disappears as it falls upon the ground. The tendency of the soil is always to consolidate; and this necessitates the frequent digging, trenching, ridging, and forking over to keep the ground open and free. When this is done the drains will respond, and the soil gradually improve in fertility and texture, requiring less manure: but it will always require digging!

The withdrawal of moisture from the soil separates the particles; excess of moisture binds them together; but a proper system of drainage, combined with deep digging and surface cultivation, results in a state of things midway between a lack and a surfeit of moisture. The condition of the soil of our gardens may be likened somewhat to an ordinary bath-sponge, which, when water is allowed to pour upon it, becomes for the time filled, soaked, surfeited; but the water, nevertheless, is rapidly running out of the sponge below. When the supply of water is cut off, the sponge is yet full of liquid, which continues to run from it for some time after. This illustrates the operation of perfect drainage—porosity assisting rapid filtration. Now, mark that although superfluous liquid has left the sponge, the latter still remains moist: so much so, that you may wash articles or yourself with it,

without a further supply of water ; and moreover, you may squeeze the sponge again and again, but it remains moist—to say the least of it, it is not *dry*. This is on account of its retentive nature. And our garden soil, however much it may be “squeezed” by the action of sun, wind, and frost, will yet retain a sufficiency of moisture for the secure existence of vegetation, provided its texture and composition are retentive enough. Nature is full of contradictions and paradoxes ; and this is one of them—that the more thoroughly land is drained of its moisture the more uniformly moist does it become—all other things being equal, of course.

Drainage alters the underground temperature by substituting warm, moist air in the place of cold water ; indeed, the climate of a district may be improved by draining land which is productive of unhealthy exhalations and cold, dank mists.

The raising of the temperature promotes faster, stronger, more luxuriant growth ; from which it is safe to argue that a warm soil requires less manure than would a cold one. Note what this higher temperature means also : ground which in its cold, wet state prohibited the successful growth of the choicer flowers and vegetables becomes amenable to the cultivation of even tender subjects ; promotes early maturity of spring vegetables, and carries through the winter unscathed those which have hitherto existed precariously even in the summer, especially if wet weather has prevailed.

Although mechanical agents and organic manures are relied upon greatly to bring about a better texture of the soil, draining does this far more effectively, because it manures the ground as well, by releasing and making operative chemical subjects that had hitherto been quiescent and useless. Excess of moisture arrests and prevents the proper decay and distribution of manurial substances, and manure becomes useless on a heavy, close, or wet soil ; but when such land is drained of its superfluous moisture, and its particles are loosened, the admittance of a larger amount of quickly circulating rainfall becomes possible ; and rain-water is very rich in essential manurial compounds.

It is therefore plain that, with a better and easier passing through the earth of large quantities of chemically-charged rain-water, an enormous supply of food that would otherwise be entirely lost to them is brought within the reach of plants; and as this is one of the most patent results of drainage and deep digging it serves to show the importance of the latter two operations. Moreover, as the excess of moisture recedes from the soil, air takes its place; the air is composed of the chemicals most required by plant-life as food, and these, becoming moistened, and combining with other chemicals already in the soil, form natural food compounds which have far greater effect than those artificially supplied.

The subject of drainage could be further enlarged upon and more fully described, but the foregoing will suggest to the reader that drainage, in some form, even if it consists only of deep-digging or trenching, is an essential factor in a fruitful garden, and must on no account be neglected. It will lighten labour, save time and money, prevent insect and disease attacks, and fertilize and energize the whole garden and the occupants thereof.

CHAPTER VII

SEEDS AND SEED-SOWING

THE sowing of seeds is really a serious operation, which is usually treated lightly. The depth, position, soil, time, etc., in which to sow should be regulated and controlled by the nature and habits of the plant, the conveniences of the sower, the method and time elapsing between sowing and germination, and the size and constitution of the seed itself. These points are usually elucidated by the seedsman on his packets and in his catalogues; but much care is needed nevertheless to ensure perfect germination and growth.

Seeds require uniform moisture, warmth, air, and darkness to germinate successfully; and even when these things are provided some considerable time often elapses between the appearance of the first and the last seedlings, so irregular and uncertain is the germinating power of seeds. The majority of seeds, however, are fairly quick in sprouting (unless very old or of weak stocks), and of these I will now treat, the more difficult seeds being the subjects of special notice.

Seeds must always be sown on damp soil; neither too wet, nor dry. Fine seeds must be given a fine, but porous soil; larger and more robust seeds may be allotted a rougher medium. The best general soil is a fibrous one: this may be composed of turf or fibrous loam (such as is found in pasture land), peat, leaf-mould, etc., a small quantity of old, spent manure (never fresh or rank), and plenty of sand (silver sand, coarse or fine; not the yellow sort, which contains iron, an injurious substance). All ingredients must be thoroughly mixed.

Special mixtures, or "composts," are usually allotted to certain plants ; but a compound of some of the above, containing a large portion of sand, is usually sufficient for successful seed-sowing. For the resulting seedlings, however, discretion is necessary ; that is a different matter. Good sandy garden soil will meet most cases.

Small seeds should be sown in boxes, pans, pots, or on hot-beds in frames ; usually a box covered with a sheet of glass is sufficient. Minute seeds must simply be pressed into the soil, and not covered (except with fine sand) ; larger seeds should be placed in the ground at a depth of about three times their size. The boxes, etc., after being filled with soil to within about half an inch from the top or rim, should be placed in water bodily, until the soil is thoroughly saturated. A safer plan is to soak the soil with boiling water—this sterilizes the compost, kills insects, weed seeds, etc.—and then to allow it to drain. When the soil is just luke-warm the seeds may be sown, thinly and evenly ; mixing the seeds with fine silver sand ensures this evenness. Now cover with glass, and place over this a sheet of paper to exclude light. When the sprouts begin to break through the soil, remove the paper *instantly*, and keep the boxes, etc. (if in the greenhouse) close up to the glass ; outside, remove the glass occasionally for airing.

Larger seeds may be sown in the open, on compact beds of fine soil. Sow in moist (not very wet) weather, and when the ground is in a friable state. Nothing is gained otherwise. Maintain the moisture by gentle sprinklings, if dry weather prevails. Do not sow thickly or carelessly. Press the soil gently after sowing. Previously, if needed, the bed should have been well watered.

The seeds of annual flowers are usually sown in spring, as early as possible ; and afterwards successively until **Annuals** mid-summer. Sow in circles. This enables a stake to be inserted in the centre of each group of plants. Annuals are of somewhat weedy and straggling growth, and very prone to fall upon the ground, becoming

thereby untidy and ragged ; therefore careful staking is necessary—one stick to each plant, even, would be beneficial.

It is inadvisable to transplant, as a rule, from the spring sowing ; neither is it really worth while. Instead, reserve a few seeds and make two or three later sowings. Always sow seeds sparingly, and thin out the young plants to at least a couple of inches apart ; then, when the character of the plants is discernible, a severer thinning may be made. This will result in a few strong, healthy plants, which will attain the maximum size and bear the largest and greatest number of flowers or fruit. This rule also applies to many annual vegetables.

Autumn sowing may be practised in suitable districts or positions. If the weather is not too severe, annual seedlings stand a good chance of surviving if the seed is sown on firm drained ground, well in the open. Wet is fatal ; therefore avoid all damp positions or soils. It is not always convenient to sow seeds of annuals in their permanent quarters during August and September, although very desirable ; therefore transplanting becomes a necessity. Annuals are notoriously bad subjects for removal, but if a good ball of earth is lifted with each plant the operation will usually prove successful with those sown in the autumn. To ensure the retention of this ball of earth, especially where the ground is of a light description, the soil in which the seeds are sown should have incorporated therewith a material into which the roots can readily strike and fasten themselves ; and this can be secured by digging into the top soil such materials as coarse leaf-mould, lumpy peat, fibrous loam, turf, leaves, cocoanut fibre, old spent manure or hops—whatever may be available locally. Then, when the seedlings are transplanted into their permanent positions in early spring (during wet and warmest days), the roots will cling to the rough, leafy substances, and will be consequently uninjured and unchecked in growth. Besides, this same material helps to aerate and drain the seed-beds, which would otherwise have a tendency to become sour and water-logged, for, owing to the loosening action of frost, wind, and rain during winter, the ground must be made

very firm and compact. Autumn sowing has many advantages. Larger plants result—strong, sturdy, bushy—each individual specimen rivalling in size a whole group of spring-sown subjects, and with larger and more profuse blossoms. Plants, ordinarily two to three feet in height and of spindly growth, become sturdy giants of three to five feet. Shirley Poppies, Coreopsis, Clarkias, Godetias, Larkspurs, Nigella, Eschscholtzias, Sweet Sultans are among the most suitable flowers for experiment.

Perennials may be considered as the permanent flowers of the garden, renewing their energies each year without trouble of re-sowing. Still, an occasional sowing—especi-

Perennials ally of new varieties—is advisable, to replace worn-out plants or to add to the existing stock. Seeds may be sown from March until the end of August. Some of the earlier-sown seedlings will bloom the same year; the majority of the rest will flower well the following season; and the remainder require two or three years of growth before reaching an appreciable blossoming status. But, anyhow, perennials are so valuable as to be well worth waiting for. Considering the extreme smallness of many of the seeds it is always best to sow perennials in frames, boxes, pans, pots, etc., or in a greenhouse, rather than in the open ground; on the other hand, the rain, drought, or winds which would prove detrimental to the more delicate seeds, will not harm such subjects as Lupins, Hollyhocks, Sweet Rockets, Galegas, Pyrethrums, Pansies, Violas, Delphiniums, Campanulas, Aquilegias, etc. Such seeds as those of Anchusas, perennial Poppies, certain Campanulas, Carnations, Dahlias, Dianthus, Gaillardias, and Primulas, prove more successful if sown in boxes or pans. A sheet of glass over the seed-box is all that is usually necessary. Sow and treat the seeds as recommended for autumn-sown annuals.

Many plants have been placed in the biennial section for treatment which are not of true biennial nature.

Biennials True biennials require three years of growth—one year to be sown and to germinate, another year to develop,

and the third to flower and seed ; then they die, and have to be replaced. This demands a yearly sowing to keep up the supply. Sow early in the year ; this practice sometimes ensures the next year's flowering. Some biennials—notably the Canterbury Bells, Meconopsis (blue Himalayan Poppies), Brompton Stocks—will grow into the fourth year before producing flowers ; but one year's loss is the next year's gain, for the plants make up for their remissness in increased stature and inflorescence. Some easily-grown biennials are : Scabious, Iceland Poppies, Pinks, Honesty, Evening Primroses ; whilst the perennials that are treated as biennials include the Antirrhinums, Sweet Williams, Forget-me-nots, Violas, Pansies, Wallflowers, Mimulus, Foxgloves, Verbascums, (*V. phæniceum*), Pentstemons, etc.

The plants in the last section either do not flower so well in succeeding years, or become straggling in growth, presenting an untidy appearance ; hence the necessity for the fresh, young, and vigorous stock secured by biennial treatment.

There are many plants belonging to the annual, biennial, and perennial sections that will not stand our inclement, damp winters, yet thrive and blossom splendidly during the summer. These are classed as half-hardy subjects, and the seeds require the aid of heat of some kind in order to germinate, as well as protection whilst in the seedling stage, until the weather permits of final planting out. Seeds are sown in boxes or pans of sterilized soil at any convenient time of the year : the annuals from January to April and May ; the biennials and perennials from March onwards. Most half-hardy subjects of all classes answer well if treated simply as half-hardy annuals—such, for instance, as the familiar bedding-plants, Asters, Stocks, Phlox (*P. Drummondii*), etc. A few others may be quoted as being very suitable for such treatment : Single Dahlias, Cannas, Lobelias, Gaillardias, Lantana, Nicotiana, *Enothera speciosa* and *E. missouriensis*, Nierembergia, *Papaver pilosum* and others, Petunias, Primulas, Salvias, Verbenas, etc.

The raising of hothouse plants requires much experience. Failures will occur with the beginner, and much patience and

Sowing perseverance are necessary. Yet the trouble is
Seeds of well repaid, for a greenhouse or hothouse can be
Tender and stocked with tropical gems at small outlay by
Hothouse raising them from seeds. Sow as is done with
Plants other seeds, generally speaking ; but warmth and
moisture must be maintained, and careful attention given.
Weeks or months may elapse between the appearance of the
first and last seedlings ; and often a weary wait has to be
undergone before germination takes place. But never de-
spair ; throw nothing away until every shred of hope has
vanished. The main difficulties consist in maintaining an
even temperature, and providing against over-dampness or
excessive dryness. Keep the seed-boxes well in the shade
until germination ensues.

Seed-pods should be gathered before they begin to shed
their contents—just as they are observed to be turning brown
or becoming withered. They must be stored so

Harvesting as to be absolutely dry. A cabinet composed of
and Storing match-boxes glued together is a useful receptacle
Seeds for seeds. Many seeds require to be sown as
soon as they are ripe, as they possess but weak germinating
power ; others will preserve their potency for years.

Seeds of a slowly-germinating character are difficult to
manage, much time, care, and patience being spent upon a

Raising procedure which, but for the expectation of the
Plants from resulting plants, would be most monotonous and
slowly- discouraging. Many Alpine seeds—notably those
germinating of Gentians and Anemones—lie for months, a
Seeds year, or even longer, without showing a sign of
life of the germ within ; and as often as not the box wherein
the seed has been sown is eventually emptied of its contents
by the despairing and disgusted sower.

Some seeds, of course, make their appearance as plants
very quickly, and grow with ordinary vigour and ease ; others,
while germinating early, are subject to a very retarded progress

in the seedling stage, and require much care to prevent damping off and other ills that attend the raising of seedlings.

Each of the three classes of seeds must necessarily be specially provided for, and sowing must be done under separate conditions adapted to their peculiarities of germination and subsequent growth.

For those of a slowly awakening character—and perhaps these are the most troublesome—deep pans are preferable to boxes, as the former retain that uniformity of moisture which is so essential ; nevertheless, they must be exceptionally well drained. The soil in the pans must be somewhat retentive, yet porous, the principal difficulty being found in the liability of the soil to sourness, and the growth of fungus. Some good materials for its composition are peat—often essential—leaf-mould, fibrous loam, with a generous admixture of silver sand, and a few lumps of charcoal to assist in keeping the mass in sweet condition. I have used peat and sand only, with much success ; but this has a tendency to become very dry on the surface, which is not desirable.

Alpines may be sown any time from April to September, May and June being the ideal season. Sow only fresh seeds. The soil should be sterilized.

After the seed has been sown the pans should be placed somewhere in the shade—not under the drip of trees or greenhouse stage ; a frame or shady shelf in the glasshouse is best. But strong sunshine and damp must be avoided if a uniform moisture and temperature are to be maintained. The difficulty in finding a suitable and ideal place for the pans is great. In any case, the attentions required from the sower are chiefly comprised in keeping the soil neither too wet nor too dry.

To determine the best treatment after sowing a study of the natural conditions which prevail in the habitat of the plants will be of great assistance. These are, roughly, a short, scorching summer and a long, frigid winter, with genial intervals of spring and autumn. It is the latter seasons which have most influence on the germination of seeds, and the only periods in which it is advantageous for the seedlings

in their own homes to make their *début*. Alpine flowers, as a rule, bloom and ripen their seeds all too quickly during the hot, sunny season ; and the seeds are scattered broadcast upon the surface of ground of not a very generous disposition—more rocky than otherwise. Should these seeds germinate reasonably early, the resulting young and tender plants would suffer great danger of being scorched to death by the fierce sun, or, surviving that, might be killed later on by severe weather, before they could gather sufficient strength to withstand the rigors of an Alpine winter. Thus nature deems it advisable to wait until the genial spring arrives before allowing the seeds to germinate : hence the long rest becomes a natural characteristic of such seeds. Seeds of those plants that are fitted to withstand adverse conditions, by reason of rapid and sturdy growth, of course quickly germinate.

It becomes plain that slowly-germinating seeds of Alpines, etc., are not harmed by contact with wintry elements, although the seedlings would be ; and we may therefore, following this deduction, safely expose our seed-pans to the mercies of our comparatively mild winters. Before doing this, however, a minute examination should be made to ascertain whether any signs of germination exist. This satisfactorily concluded, the seeds may be with impunity exposed to the action of frost, snow, and wind ; heavy or continuous rain, however, should be guarded against, or the contents of the pan will be swept away or swamped. A piece of glass placed over the pan while wet weather prevails will effect this purpose.

As soon as the weather gets warmer in the following spring, place the pans in a frame, greenhouse, or, covered with a sheet of glass, in a sunny part of the garden. The seeds will then germinate most readily, and the plants develop.

Primulas are among the slowly-germinating plants, and so are the perennial Phloxes. Rose seeds also are often laggard, as are the seeds of a large number of bulbous plants. Many of the rarer plants, too, take a long time to germinate, the principal reason being the staleness of the seeds, which often

have to be collected in their distant habitats, and the transmission of which to this country takes considerable time. In fact, most seeds bought of salesmen must of necessity be somewhat stale, on account of the interval which elapses between the collection and distribution of such seeds ; hence they lie a much longer period than is natural before germinating. But let nothing be destroyed ; a stirring of the soil alone often results in the appearance of seedlings, and sometimes when the seed-sown soil is used for the pricking-off of seedlings or for any other purpose, some laggard, almost forgotten seed springs suddenly into visible life !

CHAPTER VIII

THE TREATMENT OF SEEDLINGS

FROM open-air sowings all seedlings which are crowded must be removed, and these may be planted elsewhere to grow on, if desired. This thinning process applies chiefly to hardy annuals, and to many biennials and perennials ; but the last two classes of plants give far better results when transplanted. A bed of fine, rich soil should be prepared, composed principally of fibrous ingredients and sand or grit. This should be made moist by giving a thorough watering and then allowing drainage for an hour or so. If the seeds are sown thinly, the plants may be permitted to grow to a fairly large size before being removed, thus facilitating the operation. Always make the hole large enough, using a dibble or trowel, spread out the roots, and press the earth closely around and between them. Transplanting is best carried out in showery or dull weather—never when the sun is strong. Give each plant a little water.

Seedlings sown or transplanted in frames should have the lights removed on all favourable days, to allow as much air as possible to enter during the summer and autumn periods ; but as winter approaches the lights should be removed only on the finest days, being tilted slightly to admit air. This, of course, applies to half-hardy subjects mainly.

Seedlings that have been raised in boxes and under glass should be shifted the moment they have made three or four leaves. The place they are next to occupy is a question concerned with the constitution and class of the plants, and the purposes to which they are to be put. If specimen or pot plants are required, shifting into

thumb-pots must be the first rule ; but for planting or bedding out the seedlings should be transferred to other boxes or frames. Bedding plants, both hardy and half-hardy, should be pricked out when very small into deeper boxes or frame beds, a good distance apart, and allowed to grow on therein until the final planting-out time arrives. But hardy perennials should first be shifted into boxes, pots, or pans, and then, when of fair size and well rooted, they should be planted out in the open nursery-bed, or placed at once in their permanent quarters.

Of course many plants sow themselves, and the resultant seedlings are well able to take care of themselves also ; but

Trans-planting these may with advantage be lifted into prepared beds to develop.

In transplanting, place so that the lower or seed leaves come near to the soil, but in no case touch the ground. Shade for a few days, until the plants begin to grip the new soil. Tender plants require protection from frost and cold winds ; flower-pots inverted over them will give this. The following device is a good makeshift and cheap appliance, which I have tried myself with much success. It will prove useful for this purpose.

Make a strong framework of narrow wood (one inch square will do) ; over this stretch unbleached calico very tightly,

A Home-made Frame nailng down the edges securely. Then paint the calico with a coat or two of boiled linseed oil, in which sugar-of-lead has been dissolved—about three-pennyworth of each. This will make the calico both transparent and waterproof, and the partial darkness of this temporary “light” is just the thing for both germinating seeds and resultant seedlings, as a shelter from sun, rain, and cold—even from frost. Remove the shading, however, at propitious times for admittance of light and air.

Special soils and composts are required for certain plants, and these must be provided in the beds, boxes, or pots into which the seedlings are placed. Some subjects require a major proportion of peat ; others lime, or sand, or fibre, or

moisture-retaining material. (This matter is more fully dealt with under "Planting Out," Chapter XI.) All these details

Soils and Composts should be ascertained when seeds are purchased; much disappointment will thereby be saved. A good general mixture may be made by a selection from such materials as fibrous loam, leaf-mould, and sand (these three should form the basis of nearly all composts), peat, old dry manure, etc. ; and lime will be well represented, when required, by the addition of old mortar rubbish broken finely. Good, mellow, garden soil may be used, if well sterilized.

Three great essentials to all seedlings are : Good drainage, light, and air. Eradicate every weed, and plant firmly.

CHAPTER IX

POTTING AND POT PLANTS

TO begin with, it will be noticed that a flower-pot is composed of an extremely porous material—that is, its composition allows of absorption, retention, and escape of moisture. This points out the fact that if the pot is to remain in that condition—and it is most essential

Potting that it should—both the outside and inside of the vessel must be kept scrupulously clean, entirely free from caked dirt, green mould, moss—anything that tends to block up the pores and prevent the pot from being what it is really intended for—a perfect drainage system. This point ensured, there is a greater chance and hope of success in cultivating the plants placed in such pots, and failure and disaster should be almost unknown. The next thing to notice is the hole provided at the bottom of the pot for the escape of surplus water and the entrance of air—another factor tending to success or failure. This hole must not become choked up by the contents of the pot; therefore pieces of broken flower-pot, crockery, slate, cinders, broken brick, stones—anything of a like nature—must be placed over the hole in such a manner that water is allowed to run rapidly away, and air to enter freely. A pot with an inch or so of this material placed in the bottom may be considered to be “well crocked,” and capable of receiving any quantity of water without evil effects to the plant.

The next consideration is the soil—a mixture suitable for such cramped quarters. This is found in such materials as leaf-mould, peat, and all fibrous soils, spent manure, decayed turves (fibrous loam), mortar rubbish (that from old walls is

excellent), and last, and most important, sand, the white sort for preference. A selection from these materials should be well mixed and sifted ; the rougher portions may be placed next to the "crock" in the pot, the finer soil above. Fill the pot to about half-way up. Now place upon the soil in the vessel the roots of the plant that you wish to pot, holding the plant so that the roots just rest upon the soil. With the other hand (or, if you are "squeamish," with a trowel) fill in the soil around and between the roots, keeping the latter well spread out, straight, and even. When the roots are nearly covered ram the soil down well all round with a stick, adding more soil until all is firm, and the plant remains upright without assistance. Now fill in the remainder of the compost, pressing all well down, until about an inch of space from the rim of the pot is left. This space is necessary to hold the water which it will be essential to apply. (If a seedling, the soil must reach almost to the seed-leaves ; if an adult plant, just enough of the stem is covered to ensure the burial of every root ; plants with "crowns" or tufts must be kept well clear of the soil.) When everything is firm, and the roots are well covered, the pot should be filled to the rim with luke-warm water (never cold), or placed for a time in a large vessel of the same liquid ; then allow the surplus water to drain away (if all is well, this will happen with great rapidity), place the pot in the shade, and leave it there for a few days, until the plant begins to "pick up," and look like business. Give no more water until this happens, or until the soil gets dry.

This constitutes, roughly, the secret of the art of potting. Of course, as with everything else, there are modifications—some plants must not be potted "hard," with others it becomes imperative, etc. Always provide a pot large enough for the subject under treatment—never too large, however ! It will, I hope, be plain to every one that these are general instructions ; for special cases there must be special procedure.

House plants are often badly treated : neglect to give water, defective potting, and indifferent drainage are some of the evils from which they frequently suffer. As regards water-

ing, so soon as the soil in the pot begins to become dry the pot should be placed for a considerable time in a pail of

House Plants water until the earth therein becomes thoroughly soaked; then it should be put where it can drain properly. If the drainage has been attended to at the time of potting any amount of water can be given—especially to Ferns—without harm resulting. (See “Potting.”) Vigorous plants will require repotting about every two or three years, perhaps oftener. This is usually done in spring, just before growth is commencing, and is especially applicable to Ferns, Aspidistras, etc. If the roots of Ferns become very much crowded, and too large for a medium-sized pot, they may be divided. This requires great care, and should not be lightly undertaken. An occasional sojourn in the glass-house benefits all house plants greatly; also a periodical dose of liquid manure. The best compost for house Ferns is a mixture of turf-loam, leaf-mould, peat, and fine silver sand. A rather lumpy and rich soil is preferable for Aspidistras. Nurserymen will always be ready to supply a good potting compost, and even to do the necessary re-potting for a small charge (about 6d. per plant). Some plants—Maidenhair Ferns, for instance—when well established in large pots, would be spoiled by division; but these should have the top soil carefully removed every spring, and a new, rich top-dressing given in its place. Always allow quite an inch of space between the surface of soil and the rim of the pot, for holding water. Besides those already mentioned, some good house plants are Dracænas, *Grevillea robusta*, Palms, Ricinus, Gum Trees; while there is many a garden subject that may be carefully lifted and potted for indoor decoration. Whatever may be the things chosen for indoor use, both among floral and foliage plants, always remember that, to counteract the baneful influences of gas-fumes, vitiated air, and absence of light, which the plants must necessarily endure, the pots should be given as often as possible a chance to recuperate by being placed outdoors for part of the day, especially in *warm, showery weather*. The leaves of broad-foliaged

plants should be well washed occasionally, the finer-leaved subjects being syringed. Next to the harmful effects of frost and cold winds, standing in a draught is the worst possible fate that can be meted out to a house plant.

Do not make your house plant the recipient of surreptitious doses of tea, beer, dirty water, etc., in order to save yourself the trouble of taking the liquid away.

When a pot gets full of roots (often evident by the flagging of the occupant, which water will only temporarily revive,

Re-potting and Shifting and by the appearance of roots through the drainage-hole), the plant must be "shifted," or re-potted into a larger-sized receptacle. This is accomplished as follows: The new pot is prepared, crocked, and partly filled with earth. The compost—a rich one—should also be ready at hand for use. Now take the pot containing the plant to be shifted, place the left hand over the top, so that the stems, leaves, or crown of the plant come between the fingers, and are held there firmly. Give the pot a smart blow on the bottom with the hand (holding it upside down), or strike the rim gently on the bench or other wooden object. This will loosen and expel the contents, which, if care is taken, will come out whole and unbroken. Place the mass or "ball" of matted roots and soil in the middle of the fresh pot on top of the soil therein; fill in all round between the "ball" and the sides of the pot with compost, ramming it down as firmly as possible, until the proper level is reached. Then give a good soaking—and draining—and place in shade until the plant is established.

Seedlings of all kinds may be treated thus, as well as older plants. In fact, if all garden annuals and biennials could be raised in pots and planted out, much finer flowers and stronger plants would be obtained. Such perennials, too, as Hollyhocks, Antirrhinums, Poppies, Pyrethrums, etc., benefit greatly by initial pot culture, with several shifts into larger sizes, starting with thumb-pots.

Large plants may be obtained by frequent shifting from small to larger-sized pots. Such things as *Zea japonica*

(variegated Maize), Mignonette, Asters, Antirrhinums, etc., may be brought to an enormous size by a system of continual re-potting from the seedling stage onwards, and pinching back. The latter operation consists of cutting or pinching out the main shoot early, which induces the plant to throw out side-shoots.

Specimen and Pot Plants. These, in their turn, become subject to the shortening treatment, until the plant develops into an immense bush, which, eventually, will be completely clothed with flowers. This procedure, of course, retards the blossoming period considerably ; but the reward of patience is great. Pot plants of any kind require perfect drainage : the oftener such a plant needs water, the healthier is its condition.

BOXES—In regard to window-gardening may I plead for a complete change from the Geranium-Marguerite-Lobelia Syndicate ? Very nice these are, no doubt, and easy of culture ; but how monotonous ! Let me suggest substitutes. For spring decoration : Crocuses, Daffodils, Tulips, Forget-me-nots (*Myosotis stricta*—blue, white, pink), bushy and dwarf Wallflowers, Polyanthuses (all colours), Primroses (all colours, especially the blues), Hyacinths, Scillas, Anemones, etc. For summer : Scores of the “ bedding ” class of plants do exceedingly well in boxes ; Begonia, Mignonette, Nasturtium (dwarf), Nigella (Love-in-a-Mist), *Oenothera speciosa* and *O. missouriensis*, Primulas, Salvias, *Convolvulus minor*, etc.

BASKETS—These require much attention as to watering. Some suitable subjects are : *Asparagus Sprengerii*, *A. decumbens*, and *A. plumosus* ; ivy-leaved Geraniums and Verbenas ; *Campanula isophylla* (blue, white), *C. fragilis*, and *C. gorganica* ; Abronia, trailing Fuchsias, Nepetas, Nierembergias, Petunias, Thunbergias, *Convolvulus mauritanicus*, etc.

CHAPTER X

THE GARDEN UNDER GLASS

HOW is it that so many people, in the fortunate possession of a glass structure, fail to make the best use of it? One sees so many greenhouses crammed with two, three, or four classes of flowers only, usually Geraniums, Marguerites, Fuchsias, and other well-known plants. These, of course, are very delightful in their way, and **The Un-heated Greenhouse** people naturally have a preference for a certain flower; but certainly there should be room created for a few others. There are hosts of available and easily-grown subjects suitable for glasshouse treatment, many of them gorgeously beautiful.

The unheated glasshouse is within reach of all who can afford the outlay for its erection. Its management is simple and easy, and the subjects under treatment therein are not exacting as to culture and accommodation—in contrast to those of the heated structure. This brings the cool greenhouse well within the scope of the amateur.

Many of the hardy outdoor plants will flourish in a well-ventilated greenhouse, and will make fine specimens. Bulbs, for instance: Daffodils, Narcissi, Tulips, and Hyacinths. Lilies, often falling short of perfection out of doors, on account of wet or cold weather just when the blossoms are due, will give a grand display if taken into the greenhouse, or indeed grown therein altogether. Half-hardy annuals, perennials, and biennials are most amenable to the unheated greenhouse treatment, as they are well protected from damp and cold.

These facts bring into the range of the amateur's management many beautiful subjects the cultivation of which outside

is, for him, a precarious operation, often resulting in failure and disappointment, for which reason he wisely leaves them alone.

Such flowers as Chrysanthemums, Sweet Peas, Wallflowers, Primulas, Mignonette, Forget-me-nots, and others may be had in blossom during the winter—and especially at Christmas, if the house is not allowed to get cold by open doors or windows; and if a small stove is introduced in severe weather to keep out frost. But, at any rate, flowers may be had under glass when the outside garden has ceased to produce them, or long before the weather conditions become propitious enough in the spring to allow of floral display out of doors.

In the summer, too, there are delightful things for pot culture: Begonias, Gloxinias, Cinerarias, Browallias, Campanulas, Lantanas, Heliotropes, Carnations, Salvias, Schizanthus, Petunias, etc.; also such beautiful gems as Gerbera, Rehmannia, Hunnemannia, and Trachymene.

And the climbers! A host of them—blue Plumbago, Dolichos, Ipomcea; white, purple, and rose Maurandia; white Mandevillea; Passion Flowers, *Solanum jasminiflorum*, Smilax, Asparagus, Tacsonia, Tropæolum, Bignonia, Tecoma, Clematis, Cobæa, Eccremocarpus, Lophospermum, and a great many others may be pressed into service with careful management.

But the keynote of the culture of all is the soil. Without reference to any special requirements of certain plants, a good general compost may be said to be: Fibrous loam (from old pastures) and leaf-mould in equal portions, a little peat, plenty of silver sand, with a sprinkling of Clay's Fertilizer or similar manure, well mixed. This makes a rich, compact, yet porous soil. Good drainage is essential in a greenhouse, as copious supplies of water are necessary during the summer months.

I must not forget the Ferns and foliage plants for those who like something everlastingly beautiful, refreshing, green, and full of life and activity. You may even turn your house into a Fernery, especially if it happens to be in a shaded or

dull position, as small conservatories attached to dwelling-houses often are.

One great delight of a greenhouse, heated or not, lies in the facilities it affords for seed-raising. This is a most interesting and captivating hobby, and can be indulged in almost *ad libitum* in these days of cheap seeds, and experiments may be made in subjects otherwise entirely out of reach.

Early and tender vegetables, salads, etc., represent the advantages of a glasshouse, as well as flowers; and such things as Tomatoes and Cucumbers bring appreciation and profit to the gardener. Fruit trees and Roses in pots also may be grown.

The heated house or stove building up to the millionaire's elaborate edifice, styled a "winter garden," wherein costly exotics and Orchids are as common as Wallflowers in our borders. But the amateur's interests claim my attention; and his structure is usually an ordinary greenhouse provided with such means of heating as his purse will allow him to obtain. In this house a careful gardener can do much. Soil, again, has a great deal to do with success; and to this need is added an additional responsibility—temperature. The provision of moisture is a more acute problem and an imperative care. Still, success is sure to come—with time and experience. The Acacias, Caladiums, Cacti, Camellias, choice Carnations, Cianthus, Gardenias, Habrothamnus, Streptocarpus, Amaryllis, Eucalyptus, Gesneras, choice Ferns, Fruits, Orchids, and scores of sub-tropical and tropical subjects may be grown.

But there is no need for elaborate heating arrangements; it is surprising what may be done with low temperatures, and the beautiful things that can be evolved with the aid of a few degrees of warmth. Smoke and fumes from the heating apparatus must be guarded against, however, and efficient ventilation, without draught or admission of much cold air, must also be provided. Water very sparingly in winter—

in the morning, for preference ; later in the day in summer. See that the summer watering penetrates and saturates the soil ; otherwise it is of little use. Ventilate well night and day during the hot summer months ; but in winter only on favourable days, never while frost is prevalent.

Frames are contrivances for securing a higher temperature than that which exists in the open garden for the purposes of raising early seedlings, for protection from

Frames, etc. frost, wind, rain, etc., and for striking cuttings.

Cucumbers, melons, and early salads may be successfully grown in frames. Heat is usually obtained by heaping together fresh horse manure, straw, hay, leaves, etc., and ramming these into a firm mass, until the required amount has been collected. In a couple of days fermentation will be in rapid progress. The heap is then turned over, and beaten together again. Three days later the frame may be placed upon the heap and kept closed. The manure-heap should be about three feet high, and extend for about a foot from the frame all around. The temperature inside the frame will rise to a great height, but can be reduced in a few days to about 90 degrees by ventilation. A layer of good loam and well-rotted manure should now be placed within the frame and thoroughly watered. Plunge a thermometer into the manure below the soil ; if 100 degrees is not exceeded the hot-bed is ready for sowing seeds of almost any kind requiring heat. Formed at the beginning of the year, a hot-bed and frame can be utilized to raise half-hardy bedding plants, Onions, Cucumbers, Tomatoes, Melons, etc.

A cold frame is one placed upon a bed of rich, old manure, and is generally used for rooting cuttings, storing plants for the winter, and sowing perennial flower and other seeds in summer. In fact, the hot-bed frame resolves itself into a "cold" frame when the decomposition and fermentation of the materials beneath have ceased, and the heat therefrom has subsided.

A cloche is a glass bell, used for placing over vegetables to encourage early maturity, and over flower-plants to induce

early and larger blossom ; it is also used for striking cuttings and for protection from frost.

A rough-and-ready contrivance to take the place of any of the above is a deep wooden box, half filled with rich, porous soil, well drained by having holes drilled in the bottom and sides ; and over the top a sheet of glass, large enough to project at least an inch all round, is placed and firmly fixed.

A propagator should be in the possession of every gardener. It may be home-made—a box with a tin bottom, empty—to place other smaller boxes therein—or filled with sandy, fibrous soil ; and of whatever size may be desirable. A glass lid is next fitted—a sheet of glass, well secured, will do. This box stands upon a similar one, provided with a small door in front or side, and in the interior of which is fixed a small platform for the accommodation of an ordinary sixpenny paraffin lamp. When lighted keep the wick of the lamp very low, and well trimmed, or smoke and lamp-black will result instead of steady heat. A good, clear, blue flame of small dimensions will generate enough heat to grow and raise almost anything in the box above it. A properly-constructed propagator may be bought cheaply, however ; and, of course, is the best in the end.

CHAPTER XI

PROPAGATION

OWING to the effective agencies of insects, wind, etc., it is impossible to preserve the individuality of plants by saving seeds, unless special precautions are taken to exclude such agencies. Therefore the safest method of perpetuation of any colour or form is, where possible, through propagation by cuttings, slips, pipings, or layers ; each plant having its special affinity for one or the other.

Cuttings are lengths of ripened stem, or shoot, or branch, taken from the plant by means of a slanting, clean cut. The lower leaves and buds are removed for about half or more of its length, and the "cutting" is then inserted deeply and firmly in the ground, as far as the first leaves or buds. The best method of accomplishing the latter operation is to insert a spade in the soil, in a moist and shady spot, as far as it will go, and by a backward and forward motion widening the cleft. Withdraw the spade, drop an inch or two of sand, grit, or sandy soil into the hole, place the cuttings two inches apart in the cleft, pushing them well down, so that they rest upon the sand, and fill up the hole with sandy material, all around the cuttings. Now, with the foot, or a piece of wood, press the soil upon the cuttings, so as to close up the cleft firmly and securely. Do not be disappointed if every cutting does not "strike" ; a good percentage will do so. Roses, shrubs, and other large woody plant-cuttings may be treated thus. Cuttings of the smaller and more delicate subjects, such as Pansies and Violas, Petunias, Calceolarias, Geraniums, Verbenas, various climbers and small shrubs (such as Veronica), Tomatoes, and Cucumbers

may be inserted, after the same manner, in boxes, frames, or pots of sandy soil, or in a propagator, with or without heat. Nearly all "woody" or hard-stemmed plants may be propagated by cuttings.

Slips are really branches "slipped" off the main stem with a "heel" or joint attached, this "heel" emitting roots after **Slips** the manner of cuttings, when treated in a similar fashion. Almost any plant that will detach "slips" readily will strike. Trim the "heel," by cutting away all jagged pieces therefrom.

Pipings are the produce of jointed stems, such as Pinks, Carnations, etc., possess. Lengths of the stems are taken, **Pipings** with a swollen joint attached, which will, under correct conditions, emit roots.

An excellent method of propagating long-stemmed plants and shrubs is by means of layers. Roses, Carnations, climbers **Layers** such as Virginia Creeper, Ivies, Clematis, Jessamine, Honeysuckles, shrubs with slender shoots, etc., may be layered successfully. Some, such as Verbenas, will emit roots from their stems, without any cutting therein—merely by pegging them into the ground; others may be treated as are Carnations.

There are growths from the sides of Carnations that produce no blossoms until the second season. These side-shoots **Layering** may be layered, and will eventually become separate, vigorous young plants for early blooming **Carnations** the next year. My method is as follows: Scrape away all round the parent root soil to the depth of an inch or more, leaving a basin-like hollow all about the plant. Partly fill this with sand, road-grit, or sandy soil. Next, with a sharp knife, cut two-thirds through the stem of a young shoot, just below the joint nearest the old root. Make an upward cut. Then bend the shoot downwards and outwards until the cut portion touches the sandy soil in the hollow. Secure that part of the stem attached to the old root with a peg or pin firmly into the soil. Take care not to break any portion. Go round the plant, and serve all the remaining

shoots in the same fashion. When this is done the young shoots will be spread out pointing away from the old plant, leaving the parent crown isolated. Then fill in all round the parent stem several inches of sandy soil, burying the cut portions entirely. Press the soil down gently and firmly. Now take hold of one of the young shoots by the tuft of leaves at its top, and lift it up carefully, gently, and slowly, at the same time drawing the surrounding earth underneath the stem, so as gradually to bring it again into an upright position. This action will open the slit at the bottom of the stem, and expose it to the sandy soil ; but be careful not to perform the work roughly, carelessly, or in too much haste, or you will break the young layered shoot away from the parent plant, and spoil everything. Some moisture-retaining material should be placed over the mound of sandy soil which will now be formed, leaving just the tops of the shoots projecting therefrom. In a few weeks the cuttings will be rooted, and can be severed from the old plant, and placed elsewhere to begin an independent existence. I find that the cheapest, most easily obtained, and possibly the most effective material to use for this purpose is fine road-grit (not tarred) well mixed with pulverized horse-droppings ; the latter keeps the whole substance moist, which is the secret of success.

Fine leaf-mould and silver sand well mixed form an excellent medium for layering.

There are many subjects—such as Rambler and similarly-habited Roses, Tomatoes, Dracænas, Ricinus (Castor-oil

Layering other Plant, Vines—that may be layered by making

Subjects notches or incisions in the stems and either bringing the shoot down to the ground and pegging it thereto, covering it with moist, sandy soil, or

tying two halves of a broken flower-pot or other vessel around the stem where the cut is made, and then filling the pot with moist sand. This latter procedure is very useful in cases of lanky, unmanageable growth of pot plants, such as the Castor-oils, and where a valuable plant has become injured by accident ; a new plant is thus formed, which can be cut

away from the old one and re-potted. The former method of layering is very suitable for disposing of long Rose shoots. Rockwork, old stumps of trees, banks, etc., may be clothed with Rose blossoms by layering Ramblers over and around them, wherever the bent shoots can be brought into contact with the soil.

When striking cuttings, etc., in pots, place them around the rim of the vessel, so as to allow the end of the cutting "**Striking**" to rest against or near to the side of the pot, the **In General** moisture of the absorbent material of which the pot is made conducting to the more ready emission of roots.

Points to remember are that moisture and sand are the chief agents to induce roots from cuttings (the use of the latter being the prevention of the presence of too much moisture, which would probably rot the cutting); and, in many cases, a gentle warmth—that of a hot-bed, propagator, or greenhouse—is requisite.

Success and failure are so inextricably mixed where the striking of cuttings is concerned that nothing definite can be prophesied of either. Some people, it seems, have a sort of aptitude for successfully inducing all sorts of odd bits to emit roots; others are just as unlucky. However, like every department of gardening, this one requires care, attention, common sense, and plenty of patience!

CHAPTER XII

THE CULTIVATION OF FLOWERS

IF there is a phase of gardening I dislike it is the formal laying out of beds and borders. I prefer to see the plants grow naturally—and orderly, nevertheless—and nature cannot be improved upon for choice of position and disposal of her products. Let us, therefore, study and imitate her as far as possible and convenient.

Disposition and Planting But, of course, in many cases, formal beds are a necessity. Small plots in lawns, and other isolated beds, and very narrow borders, can only be treated effectively by the formal and geometrical disposition of plants; haphazard planting would result in confusion and shapeless untidiness. But when the border is of good width and depth, the arrangement of the plants should be such as to lend a natural gracefulness and easy effectiveness to the flowers which will presently beautify them. There is as much artistic skill required in the laying out of an herbaceous border as in the symmetrical arrangement of a formal bed. Many a slender, graceful group of flowers is spoilt by the proximity of a rather coarse-growing mass, which over crowds and overwhelms the former by its aggressive robustness. And often two colours are hopelessly confused when growing closely together; whereas by the interposition of some pleasing contrasting tint they would stand out vividly and effectively.

When committing a plant to the ground there are many things to consider: the height, manner of growth, habit, style of rooting, colour of the blossoms, the density or lightness of the foliage, the number and size of the flowers and flower-spikes. All these particulars ought to be studied and allowed for.

The tallest subjects should be placed at the back of the

border or centre of the bed, and the various heights carefully graded—and lowered—as the plants approach the edge. Often, however, a vigorous two-foot plant will outstrip its reputation for height, and take on another foot, which creates an awkward situation; whilst one of a taller habit will not rise to the occasion. It is probably the fault of position, or of richness or poorness of soil. This points out the necessity of ascertaining every particular concerning each flower, so that the correct treatment may be given—the poorer soil for rank-growing plants, the richer soil for those of a less robust constitution; a sunny place for sun-loving subjects, and shade or partial shade for those which will thrive in it.

By "shade" is meant a place that gets the sun for only a small part of the day, or that portion of the garden which is overshadowed by a wall, fence, or building; not, however, a place under large trees or tall vegetation, where the sun never penetrates. Sun is essential to all plants; some like a little, others require much.

There are plants suited to exceedingly dry or hot positions—Portulaca, the Poppy-Mallow (*Callirhoë*), Marigolds, Sedums, Saponarias, etc.; and there are those that must have a permanent moisture around them—Ferns, Spiræas, *Mimulus*, *Myosotis*, Forget-me-nots, etc.; others will only flourish in proportion to the amount of water at their roots, such as bog and waterside subjects.

The root of a plant will often indicate the treatment it should be accorded. A long, tough tap-root will accommodate itself to any soil, especially where there is much depth of earth, as its penetrating power is great. An underground stem-root, which runs along just beneath the surface—perennial Sunflowers, *Calystegia* (Bellbind), Mint, Everlasting Peas are examples—will require a sandy or other light soil. Tuberous-rooted plants, such as Dahlias, are susceptible to damp and frost, and should be planted in well-drained ground, the fleshy tubers decaying quickly where excessive moisture abounds. Fibrous-rooted plants (bedding subjects, for instance) require a somewhat light, rich, yet retentive soil.

In planting flowers of any kind, always make the hole large enough to accommodate the roots ; and the "crown" of the plant—the part where the leaves or stalks join the roots—should be well above the soil, and planted so that none of the roots are exposed. It is well to remember that the smallest cut or breakage in the fleshy part of a root, or stock, gives opportunity for the entrance of a number of insect, parasite, and fungoid pests, which attack the wound, and either eat away the vitals or introduce disease, and thus kill the plant. Therefore go carefully and circumspectly, and cut away all damaged parts.

The result of the thorough understanding of a plant, whether vegetable, fruit, or flower, is always a better product ; for such intimacy conduces to increase of size,

**Manage-
ment** substance, and numbers, as well as better flavour, colour, and general growth. People do not understand the occupants of their gardens, as a rule, and therefore do not always manage things in the best style.

For instance, they are afraid to cut the blossoms from their plants, this disinclination evidently arising from the fear of spoiling the beauty of the garden. But it should be remembered that the disability is only temporary. I am acquainted with a man who judiciously manages a score of *Campanula persicifolia* plants in such a way that they produce blossoms over a period of about four months, with the exception of an interval of a week or two ; and that simply by carefully picking off all faded flowers from the stalks. Besides, the next best joy of a garden to its possession is the privilege of gathering from it cut blossoms for the decoration of the house ; and this privilege is often not taken advantage of as it should be, with the result that the garden produces few flowers, and becomes quite desolate at some periods.

I would say to every gardener, "Do not hesitate to cut the blossoms of your Roses, Sweet Peas, Pansies, Violas, Poppies, etc. Nature will respond nobly by giving one, two, three, or more blooms for each one you take away."

The explanation of it all is the fact that one great object

of a plant's existence seems to be to reproduce itself, and to leave sufficient progeny, by means of its ripened and scattered seeds, to ensure that reproduction ; and the more the plant is thwarted in its desire, the greater will be its endeavours to accomplish its purpose in life. Thus a Rose-bush, on being denuded of a flower—which means the loss of a seed-pod—hastens to repair the damage, and sends up shoots from branch and root tipped with the buds of substituted flowers. The Sweet Pea, Pansy, and like plants act in the same manner, until frost or cold winter winds put a stop to their exertions. Of course all flowering plants cannot be treated thus—some will not replace blossoms taken away ; but many herbaceous plants, such as Erigerons, Oriental Poppies, Campanulas, Doronicums, Galegas, Anchusas, etc., will produce a second crop of blooms if the flower-stalks are cut down before seed forms. The same principle actuates the formation of a multitude of side-shoots when the main stem or stems of a plant are pinched out ; thus does Nature again assist the gardener to secure a greater profusion of blooms, and to transform a straggling stem into a symmetrical bush.

Always stake plants at the first opportunity ; tie the raffia loosely, to allow for future growth ; and thin out shoots where too crowded.

There are many gorgeous and ornamental plants, catalogued as hardy, or nearly hardy, that rarely find a permanent

The Plant-ing of Tender Roots place in our British gardens. Often a new plant is tried ; good specimens are obtained by seed or otherwise, and are then committed to the mercies

of a soil and climate anything but the counterpart of their native habitat—and, perhaps, they have just been taken from a frame or house where they have been deriving advantage from a medium suited to their needs. They may, by good fortune and kind weather, bloom well the first year ; or they may not. Then comes winter, with frost and damp—terrible enemies of unacclimatized plants ; and in spite of “protective” materials they succumb, and are looked for in vain the following season.

There are two main causes for this disappointing effect : extreme cold and excessive moisture, as represented by an ungrateful, close, badly-drained soil. Such a medium gets quickly water-logged during heavy rain, and remains cold, dank, and sour all through the winter. It is of small use to place protecting material of any sort over this kind of soil, for even if such material allows water to pass rapidly away, the moisture is caught and held by the soil underneath, thus creating even a worse state of things.

It really resolves itself into a question of drainage, which raises the temperature of the soil, and will solve many difficulties that surround the cultivation of rare and beautiful plants—often the natives of mountainous districts, and accustomed to a peculiar climate and soil formation which it is difficult to imitate. The prominent features of such districts are nearly always a deep, well-drained soil ; a protective covering (snow) upon the surface during uncongenial weather ; and a hot, if short summer, which brings the floral beauties to a state of perfection, afterwards ripening both seeds and roots.

With regard to the last-mentioned of these features we are, of course, entirely at the mercy of the weather ; but the first two may well and effectively be imitated.

There are many beautiful flowers, for instance, that a cold clay soil prohibits, even if this is as well drained as clay admits of ; and the best way of overcoming the difficulty—seeing that soils cannot be renovated or their character changed without a sufficient lapse of time—is to remove a portion of the ground at the spot where it is desired to plant the subject, to the depth of from two to three feet, afterwards filling the hole (which need not be of great circumference) with a warm, porous medium of a character to suit the special requirements of the plant—leaf-mould, loam, plenty of sand, peat and old hot-bed manure, grit, chalk, etc.—for the reception of the roots. First of all, though, stir the soil at the bottom of the hole, and throw in several inches of broken crocks, slates, bricks—anything of a porous nature, and lying

loosely, to let the surplus water pass quickly from the soil above.

Under these conditions many somewhat sensitive roots may be safely wintered, with the provision of a slight top-protection of ashes, bracken, or other litter. Frost being safeguarded against, there need be no fear of damp, for all water, however copious, rapidly filters through to the bottom soil.

Some plants require a thorough ripening, or baking, after the flowering season is over; and a piece of glass tilted over the roots, the dead stems being first removed, will concentrate the full power of the autumn sun upon the plant. The same glass will serve to keep off rain from things that are susceptible to damp. Warm rain is always beneficial, and need not be guarded against; but cold downpours are injurious in many cases. Snow always acts as a protection to plants, and need not be feared.

Many gardeners are struck by the appearance or description of a certain flower, and they buy plants or sow seeds, only to lose their cherished possessions during the winter months; and then they disgustedly resolve to waste no more time and money on such elusive things. I write these few words on the rarer plants for the encouragement of would-be experimenters, and hope that it may be productive of persevering trials of many a lovely gem. People are naturally shy of attempting to grow plants with a reputation for disappointments, hence the absence of many a graceful exotic subject from our English gardens has to be mournfully deplored.

I should like to mention a few such plants before I leave the subject:

**Some
Tender-
rooted
Plants** There are the Incarvilleas (lovely red trumpet-shaped flowers, and large, handsome leaves)—especially *I. Delavayi*—all of which hail from China; the Romneyas, huge bushes covered with large, beautiful, pure white, Poppy-like flowers, natives of California; *Ostrowskya magnifica*, a glorious Bell-flower from Central Asia, with splendid grey-green foliage and four-feet stems, and exquisitely delicate bell-shaped lilac

blossoms; *Eremurus*, with white, yellow, pink, and intermediate shades of blooms on slender spikes ranging from three to nine feet high, coming to us from the Himalayas; the *Bocconias* (Plume Poppy), of imposing, grey, heart-shaped foliage and cloud-like masses of inflorescence, also from China; and the *Hunnemannia* (Californian yellow Poppy), of two-feet stature, and most handsomely-cut grey-green leaves.

It seems a pity that some of the most gorgeous and ravishing flowers are biennials. Take the *Meconopsis*; the whole genus are of biennial duration, with the exception of one or two of the lesser species, notably the Welsh Poppies (*Meconopsis cambrica*). What would one give to possess a hardy perennial of the size, habit, and loveliness of *M. Wallichii*, the most beautiful of the group? This plant produces exquisite sky-blue Poppies in profusion on its four- to five-feet stem and many branches, and also possesses glorious foliage covered with golden hairs! It would take a page to describe its loveliness; yet it is a biennial, and to perpetuate it seed must be sown every year. But it is of no use to bemoan the fact; it is easily raised from seed, as are the other varieties, and not of difficult culture; likes shade, peat, moisture, and rich soil. This may be said of *M. integrifolia* and *M. paniculata* (yellow); *M. racemosa* (blue); *M. nepalensis* (claret); *M. sinuata* (blue), and others. These beautiful subjects are natives of the Indian, Tibetan, and Chinese Himalayas. Note the unusual blue colour of these glorious Poppies!

Flowers with long roots, of course, require a deep soil, and plenty of manure. Examples: Roses, Sweet Peas, Oriental and other perennial Poppies, Galegas, Lupins, Anchusas, Verbascums, Hollyhocks, *Aconitum Deep-rooting Flowers* (Monkshood), Evening Primroses (tall varieties), Aquilegias, Gypsophilas, etc.; and most bulbs send down their roots to a great depth, as, of course, do many flowering shrubs and trees.

Those of a surface-rooting habit need a light, sandy soil,

rich and open, much watering, and an efficient mulch in hot weather. Examples: Perennial Sunflowers, Phloxes, Michaelmas Daisies, Erigerons, Campanulas, Begonias, Iceland and Annual Poppies, Daisies, Pansies, Violas, Wallflowers, Forget-me-nots, Primulas, Primroses, Polyanthus, Sweet Williams, Pinks, Carnations, Canterbury Bells, Chrysanthemums, Cosmeas, Geraniums, Nasturtiums, and nearly all bedding plants.

Well-drained soil, protection from frost, and in many cases lifting from the ground and storing in sand for the winter,

Fibrous or Surface Rooting Flowers are the essentials governing the culture of tuberous subjects. Those that require storing include Begonias, *Salvia patens*, Commelinias, Dahlias,

Marvel-of-Peru, *Tropaeolum tuberosum*, Cannas, etc. In mild districts tuberous plants may be left in the ground during winter, but must have a protective covering of ashes, litter, or similar material. Such subjects as the Day Lilies (*Hemerocallis*), Montbretias, etc., are perfectly hardy.

Bulbous plants, although containing within themselves a goodly store of nourishment, yet send into the soil very

Tuberous-rooted Flowers from Bulbs long, usually fleshy, roots. This indicates a deep, rich medium, not so fine as to become very compact, but somewhat rough, fibrous, gritty, or sandy. The bulbs must be planted at a depth

commensurate with their size—the larger the bulb the greater the depth; but, nevertheless, there will not be much difference in the depth of the smallest and the largest sizes—it will be reckoned only in inches. Those of the size of Crocuses may be planted about two inches deep; Daffodils, Gladiolus, etc., three to four inches; Hyacinths, four to six inches; Lilies, never less than six inches; and so on. There must be at least two inches of soil above the top of the smallest bulbs.

The most I can do in my limited space is to attempt to classify the different bulbs, so as to enable the reader to deduce the kind of cultivation which each class requires.

Many bulbs bloom in the spring, when there is little leafage and no dense growth ; these bulbs can be utilized for beautifying spaces whereon flowers will not thrive at any other time of the year. For instance, under trees, on shady banks, etc., the following are suitable : Daffodil, Narcissus, Jonquil, Oxalis, Anemone, Scilla, Snowdrop, Aconite, blue and white Bluebells.

Crocuses (for edgings or clumps), Crown Imperials, Gladioli, Hyacinths, Ixias, and Tulips require an open position, well manured and cultivated.

LILIES—A deep, rich, moist loam, with a liberal addition of peat, leaf-mould, and well-rotted manure, will grow many Lilies to perfection. The base of each bulb should rest, when planted, upon a small bed of sand ; sand should be poured around the sides, and quite an inch of the same material on top. In fact this is a safe proceeding to adopt with all bulbs. There is no reason why, because a bulb is of a hardy description, it should not be accorded protection from the attack of frost and excessive wet, which would make havoc of its susceptible flesh ; therefore, Lilies being no exception to this rule, a slight covering of litter, old manure, or sand may be given them with great advantage on the approach of severe weather. A somewhat shady position should be selected : a site which gets the midday sun. Many Lilies (*L. auratum* and *L. speciosum* especially) are of a surface- or stem-rooting habit, as well as producing roots from under the bulb. These must receive a top dressing of rich, sandy soil as growth progresses ; and when grown in pots, two inches of space from the rim of the pot must be allowed to accommodate such top dressing. Keep the soil well moist wherein Lilies are planted ; if the ground has been thoroughly and deeply dug, and the bulbs have been planted properly, too much water can hardly be given.

SUMMER-FLOWERING BULBS—Every one is familiar with the spring bulbs ; those that flower in summer are not so widely recognized. They should be planted in deep, rich soil, at a fair depth, and given a mulch in dry weather. Gladioli of

many kinds, early and late ; *Galtonia candicans*, with grand four-feet spikes of white flowers in August ; *Lilium tigrinum*, *L. elegans*, *L. croceum*, *L. longiflorum*, *L. umbellatum*, *L. Martagon*, *Ixia*, and *Sparaxis*, are some of the best.

AUTUMN-FLOWERING BULBS may be accorded similar treatment to those named above. They comprise *Lilium auratum* and *L. speciosum*, Colchicums (autumn Crocuses), and Crinums (Cape Lilies).

BULBS IN POTS—All the hardy garden bulbs will give excellent results when grown in pots, the most suitable soil being a moderately porous one, composed of old loam, good rotten manure, leaf-mould and sand. The smaller bulbs may be planted three, four, or more in a pot, the larger ones singly. There are also many more tender bulbous plants which must be given the protection of glass, and for them pot culture becomes essential. These include: Cyclamens (fibre, peat, cow manure, moisture) ; Gloxinias (start in heat in spring ; or from seeds) ; Freesias (pot in autumn ; light, rich soil) ; Tuberoses (easy culture, sweetly scented, winter-blooming) ; Nerines (winter-flowering) ; the rarer Lilies, and others. When bulbs are first potted, the pots should be plunged in moist ashes, to encourage root-growth.

BULBS IN GRASS—Spring-flowering bulbs on lawns are charming. Take out a piece of turf and plant the bulb in the earth underneath ; fill up with good soil and manure. The top growth can be cut with the grass after flowering is past. Try Scillas and Snowdrops especially !

ROSES—Plant firmly in rich soil deeply dug, with a subsoil well manured. Do not discard the Rose if the shoots turn brown and the bush looks as if it were dead. Cut **A Few Notes on Favourite Flowers** the dead portions back, and in nearly every case the Rose will break into life from the roots, however tardy this action may be. Do not prune too hard unless it is absolutely necessary, as in the case of weakly-growing bushes ; I have a conviction, from personal experience of pruned and unpruned bushes, that too severe pruning facilitates the attacks of insect pests and disease ; and I

firmlly believe this theory will eventually prove to be a fact. Allow Roses to grow into fair-sized bushes and be covered with a mass of bloom—unless, of course, blossoms for exhibition purposes are wanted. Keep them well in hand, certainly, by any necessary pruning, and by removing all shoots which overcrowd and block out light and air ; but to cut them to the ground each year, though right, of course, from the theoretic and orthodox view, is a mistake from that of decoration.

Besides, it is more beautiful to see Roses upon a bush three feet or higher from the ground, rejoicing in the sun, than close to the earth, where they are liable to become begrimed. The larger the available surface the more flowers will there be—not so fine or perfect, perhaps, as those that severely-pruned bushes would show ; but to be able, at one gathering, to cull a large bunch of half-opened Roses for our vases, is surely better than to see merely a dozen extra-choice and perfect blooms, which, being the proud gardener's pet productions, are deemed too precious to be removed from their natural surroundings. Do not forget that the prunings will provide cuttings to secure Roses on their own roots.

SWEET PEAS—Quite enough has been said by others about these fragrant flowers ; but I should like to remark that I agree with many gardeners that Sweet Peas are usually over-manured ; they become dyspeptic, of delicate constitution, and the prey of disease.

PANSIES—Is it not a fact that, although Violas are plentiful in all gardens, Pansies are scarce in proportion ? Pansies require a deep, moist, porous soil to grow to perfection, and plenty of manure—in the soil, and as a mulch in summer. Sow seeds in autumn ; transplant to firm soil which contains much fibre or leafy material. Growth commences very early in spring, treated thus ; and if quickly transferred to their permanent positions, the plants bloom soon and well before the hot summer cripples their energies. Sow a fresh batch (or take cuttings) each year.

POPPIES—Why should we not have a Poppy border or bed ? The variety of colours and forms is great. Tall

subjects—*Papaver orientale* (all shades of pink, red, heliotrope); *P. bracteatum* (huge, blood-red); *P. rupifragum* (orange); *P. pilosum* (buff)—all these are perennial. Dwarf Poppies: Iceland (biennial); Alpine (perennial). Annual Poppies: Shirley, Caucasian, Mexican (yellow), Carnation, Paeony, and scores of others in all shades! Now, to complete the picture, add a centrepiece composed of the lovely *Meconopsis Wallichii* (blue, four feet) and *M. integrifolia* (golden yellow, four feet); then intersect with such things as Hunnemannia (Californian yellow Poppy), the Horned Poppies (*Glaucium*), the Prickly Poppies (*Argemone*), the Welsh Poppies (*Meconopsis cambrica*, single and double); and form an edging with the Alpine Poppies (*Papaver alpina*, in rose, pink, white, yellow), Platystemon (a cream trailer), or dwarf Eschscholtzias—then you have an entire group of Poppies, of every colour, and blooming at all times of the summer!

WALLFLOWERS should be grown in mixture instead of the usual blood-red and yellow. Note the colours obtainable besides: white, violet, ruby, brown, gold, primrose, salmon, dark red.

For floral edgings I should like to mention a few subjects which I have proved to be of the greatest success. One is

Edgings (Floral) *Myosotis stricta*, the Pillar Forget-me-not. These are in pink, white, and blue, about six inches high, and are continuously in bloom from early spring to midsummer. Sow seeds each summer, or divide old plants. A pennyworth of seed of each shade will serve to edge a very large garden with the most beautiful belt of colour. These Forget-me-nots do not spread or fall untidily on the ground. They also do well in pots. Dwarf Campanulas make delightful edgings, only three to six inches high. The sorts suitable comprise: *C. carpatica* varieties: *C. muralis*, *C. pumila*, *C. turbinata*, *C. attica*, *C. Allioni*—these will produce pale, dark and sky blue, violet, purple, and white flowers; all easily raised from seed, and all except *C. attica* being perennial. Dwarf Linarias, Lychnis, Mimulus (Alpine), Oxalis, Primulas, Saponarias, Silenes, Violas, all make good floral edgings.

There are many plants of excellent merit that may be transferred from the hedgerow, waterside, and meadow to the garden with the greatest advantage. There is the wild Chicory, for one thing, which grows everywhere in the British Isles, I believe, and may be had for the lifting from the hedges and fields and carrying home. Why this plant has not become a common inmate of British gardens it is difficult to understand ; I have only seen it growing in one garden—and that my own ! Wild Chicory throws up four-foot to five-foot spikes of large, intense blue, daisy-like flowers, and at the back of the border, amidst the Hollyhocks, shrubs, etc., it has a grand effect. Blue flowers are scarce, and that scarcity makes this one welcome. Moreover, the plant possesses a very long, tough tap-root, which will penetrate, loosen, and aerate the hardest subsoil. It withstands drought as few other flowers will. *Glaucium flavum* should be sought for on the sand-dunes of the East Coast of England. This is a "horned Poppy," so-called on account of the peculiar seed-pod, which rises and curves above the adjacent blooms to a length of as much as one foot, often giving the flower near it the appearance of possessing a horn. Its large blossoms are of a yellow colour and it is a beautiful garden subject. On the uplands of Wales resides another Poppy (*Meconopsis cambrica*), which has also become a garden plant. The native Sea-Holly (*Eryngium maritimum*) is to be found on our coasts (especially in the south) and in many places inland. In the spring many marshy meadows are starred with the Ladies' Smock (*Cardamine pratensis*) and the Marsh Marigolds (*Caltha palustris*). The former should be lifted and carried home, for, if potted and kept well moist, a most handsome, drooping, fern-like plant will result, and bear a crop of pretty lavender flowers in spring. By the waterside is to be found the purple and yellow Loosestrife (two-feet perennial), the Creeping Jenny (*Lysimachia*), and the pretty little Water Mimulus, all of which may be grown in the border if kept well watered. In the woods, especially in spring, will be found Wood Sorrel

(Oxalis), Anemones, Primroses, Violets, etc., and on heaths and meadows, especially in the south of England, grow several hardy Orchids, all of which can be transferred with advantage to the garden. Even the familiar Ragged Robins and Willow Herbs, when grown in groups, are not to be despised. Give these plenty of moisture. Lastly, there are British Ferns. I would suggest that more use should be made of our native flowers ; many of them are really beautiful, or would become so under cultivation and the restrictions of a garden. Many a corner could be adorned by their presence, their spreading proclivities being kept in hand by removing all seed-pods.

CHAPTER XIII

CLIMBERS, SHRUBS, HEDGES, ETC.

FOR climbing plants it is safe to argue—considering the enormous length of stem and number of flowers that they have to support—a very rich, deep root-run must be provided. Very often climbers are planted next a dry wall, fence, or near roots of trees, where little or no moisture and food is available; this deprivation **Climbers** points to the necessity of an adequate application of water and liquid manure. As the function of climbers is to make plenty of "wood," or stem, they may be encouraged in this by incorporating fresh manure with the soil, with an annual addition thereto. Climbers require but little pruning; rather merely the removal of worn-out or weakly stems.

Many of the half-hardy class of climbers, usually the subjects of the greenhouse, may be successfully grown outdoors, if they are planted against a warm wall or fence and a winter mulch of decayed manure is placed over the ground containing the roots. Of course the soil must be specially well drained for such climbers. These include: *Cobæas* (purple and white), *Maurandias* (several colours), *Tropæolum speciosum* and *T. tuberosum*. *Plumbagos* are best grown in pots sunk into the soil, and trained to long bamboo stakes, the pots being taken into the glasshouse for the winter; *Streptosolen*, *Solanum jasminoides*, and other greenhouse climbers may be treated in the same fashion. In the Clematises there is quite a host of climbing subjects, and most handsome are the large blooms; these lovely climbers are of very easy culture, and will quickly cover a large space.

Other valuable hardy climbers, or plants which may be

trained to the wall, fence, or trellis, include: *Aristolochia Sipho*, *Bignonia*, *Pyrus japonica*, *Convolvulus*, *Ipomoea*, Canary Creeper, Everlasting Peas, Nasturtiums, Passion Flowers, and *Polygonum baldschuanicum* (a most rapid climber which will cover arches, poles, trees, pergolas, etc., in an incredibly short space of time). But the best-known climbing subjects are undoubtedly the Roses, especially the Rambler section—red, pink, cream, white, and other colours. Besides such teas and hybrids as William Allen Richardson, Alberic Barbier, Maréchal Neil, Gloire de Dijon, etc., there are excellent newer climbing varieties.

Foliage climbers include the Virginia Creepers (*Ampelopsis*), the Ivies (especially the variegated sorts), Jessamine (summer and winter, evergreen, bearing also sweetly-scented flowers), and Hops (especially the Japanese kinds). Ornamental Gourds, also, are not to be despised as climbers. (See Chapter XIV.)

Some plants, trees, and shrubs produce either inconspicuous or unlovely flowers, but possess beautiful foliage. These are

usually cultivated for the sake of their ornamental
Foliage Plants leaves only. There are others which, while possessing blossoms of fair calibre and beauty, retain their leaves or berries through the winter months. These latter include Veronicas, Myrtles, Berberis, and certain Roses (Alberic Barbier, for instance). Of the former class many are used for bedding purposes: Kochia, Rex Begonias, Beet (red and yellow), Perilla, *Pyrethrum aureum* (Golden Feather), Variegated Maize, and Coleus (foliage of all shades and markings). Of the taller subjects may be mentioned the Castor-oil Plants, various Palms, Asparagus, and Abutilons. Nearly all foliage plants may be cultivated in pots, and when thus grown should receive copious doses of liquid manure and soot-water, which impart great lustre and depth of colour to the leaves.

EVERGREENS—Evergreen shrubs are universal favourites; so much so that they are somewhat overdone in our gardens and have become monotonous. A few evergreens of some

kind are certainly a real necessity in every garden of fair dimensions, especially in the forecourt. But evergreens, unfortunately, do not always receive the treatment

Ornamental Shrubs and Trees they deserve. It is marvellous how Privets, Euonymuses, Laurels, and other evergreen shrubs

will grow under the most adverse conditions, even when planted closely together, their roots hopelessly matted and interlaced, until the soil in their immediate neighbourhood has all but disappeared. And this is most unfair to the shrubs. They should receive a fair share of attention in the way of cultivation, manure, and water. With regard to the two latter details, manure should be annually placed over the roots in the autumn, the ground being forked over and the manure buried in the spring. And the shrubs should receive a share of liquid in the summer months, at a time when the rest of the garden is being treated. The sub-soil should be dug and manured well before planting.

There are certain ornamental standard shrubs which for lawns, centrepieces, etc., are invaluable. Roses, of course,

Ornamental Standards are much used; but such flowers as Geraniums, Heliotropes, Fuchsias, and Marguerites, trained to

standard form, are also very desirable. The procedure for forming these standard plants consists in removing all shoots from the sides of the main stem until the desired height of such stem has been reached, when the "crown" is encouraged to develop. These very ornamental subjects are best grown in pots, so that they may be wintered indoors. They are very useful for summer bedding, or, allowed to remain in pots, are sunk into holes dug in the lawn, where they present a very graceful appearance. Many fruiting trees, too, are utilized in the flower-garden. The Japanese Cherries, Pears, Quinces, Plums, etc., the May trees or Haws (*Crataegus*) in the spring, and the various Crabs, with their lovely, many-tinted fruits in autumn, are not used so much as they ought to be. Laburnums, Japanese Maples, and other descriptions of trees may be profitably introduced into small gardens if kept well in hand by pruning.

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As trees may be regarded as permanent inhabitants of the garden, the sites must be well prepared for their reception by deep digging and subsoil-manuring ; then firm planting and secure staking must be the next consideration. A layer of manure placed around and over the roots of trees during autumn, winter, and spring, and then dug in, will be productive of better growth, finer foliage, and masses of blossom. Copious waterings, too, should be the rule in dry weather.

"Weeping" trees are extremely handsome, and add considerably to the appearance of a garden, being especially

Weeping Standards suitable for isolation on lawns, where plenty of room is available for development. Roses (of the climbing sorts), Philadelphus, Willows, Laburnums, and many leguminous shrubs, Cherries, etc., may be easily trained into weeping form, usually being first grafted on to the "standard."

Many flowering shrubs are fibrous-rooted, and can with advantage receive surface cultivation and manurial treatment, especially in the way of the mulch, both in summer and winter. For spring and summer blooming there are a great many to choose from ; and the autumn and early winter are made bright by the colours of the leaves, berries, seed-pods, etc., of some of these shrubs. The following are a few of the best : Berberis, Buddleia, Azalea, Rhododendron, Ceanothus, Cistus, Colutea, Cotoneaster, Cytisus, Daphne, Deutzia, Forsythia, Genista, Hibiscus, Hydrangea, St. John's Wort, Kalmia (a beautiful shrub), Philadelphus (Mock Orange), Syringa (Lilac), Rowan, Robinia, Flowering Currant, Veronica, Viburnum, and a host of others quite as beautiful.

Hedges, of any kind, should never be planted in the haphazard fashion so often seen, but ought rather to receive a **Hedges** fair amount of attention in the way of deep digging and a supply of manure. Hedges often suffer, too, from lack of water at the roots, and, as a consequence, the roots encroach upon the garden in search of moisture, thus becoming a nuisance. Much of this trouble could be

avoided by preparation of the soil and by keeping the roots fairly moist afterwards. I have seen gardens where, for two or three feet from the hedge, the soil was drained of its nutriment by the hungry roots of the hedge-plants, and was simply a mass of dry fibre. Borders adjacent to hedges need to have the soil either renewed or well manured occasionally ; but it depends much on what the hedge may consist of.

Privet is undoubtedly the most popular hedge-plant for front gardens, especially the variegated kind. Other evergreen hedges may consist of Euonymus, Holly, Yew, thickly-growing subjects which are best avoided if light and air are required for the garden. These, however, when first planted, should be kept well pruned close to the ground, thereby inducing a thick bottom growth. People are often in too much of a hurry to secure a full-grown hedge, and in consequence obtain a mass of leafage at the top, and but bare stems lower down.

Where light hedges are required to divide off certain portions of the garden, or to obtain seclusion for a lawn, there are many subjects to draw from which are but little employed. Of course there are the familiar Sweet Pea hedges ; but a permanent hedge of Everlasting Peas of many shades of red, white, and even blue, is a fine summer acquisition ; so are those composed of Roses. Rambler shoots, for instance, often grow many feet in length ; if these are layered (see "Layering," Chapter XI) several times along their extent, and the shoots disposed in arch form from layer to layer, one of the most delightful hedges or screens for the summer is secured, which can be kept in hand by pruning. *Pyrus japonica*, well established and pruned into shape, can be formed into a hedge of low or high stature ; as can fruit trees—ornamental and profitable at the same time. For those who live near the sea, hedges of Tamarisk, kept well pruned, are excellent.

CHAPTER XIV

THE ROCKERY

ROCKWORK may easily become a feature of any garden, however small; indeed, in many limited enclosures, where damp and shade render the soil unfit for most subjects, a rockery saves the situation. There are many types of rockwork: valley, cliff, wall, bank, etc. The best plan is to copy nature. For all purposes, the method of building a rockery is much the same. First, excavate the soil to a considerable depth at the place where your rockery is to be situated; and moreover, let the dimensions of such rockery be in accordance with your means of construction and power to make it effective. Do not be too ambitious concerning rockwork; a little goes a long way, and can always be added to. In the cavity drainage material should first be placed. This can consist of whatever may be at your disposal: builders' rubbish, boughs of trees—anything that will allow water to percolate readily. Or the soil at the bottom of the hole may be broken up, by means of digging tools, pick-axe, or crowbar, according to the hardness of the ground. Upon the "drainage" the earth taken out may now be shovelled back, mixing therewith some good strawy animal manure, grit, sand, soot, and lime. When the replaced earth has reached the original level of the ground, after being well beaten down, the rockwork may be commenced. The material used depends upon the resources of the district and the largeness of the rockery-maker's purse; but the manner of its disposal is momentous. The outline of the rockery may be likened to one's domestic stairs—but the rocks are so disposed as to recede as they are built upwards,

each with a downward tilt towards the interior mass of soil ; this formation facilitates the retention of moisture naturally or artificially applied, which is thus conveyed to the "pockets" containing the plants. No rock should overhang another in such a way that it prevents moisture falling upon the under stone. Of course straight lines are neither necessary nor desirable ; any arrangement which fancy and taste dictate may be adopted, provided the one essential rule is kept in view—no overlapping ! As the rockery progresses, the bulk of earth behind the stones may be added to from the excavated soil, of which there will still be plenty left, and rammed well into the interstices of the rocks ; otherwise there will be vacancies created between the "pockets" and the bulk of the soil ; and the roots of the plants, on reaching these vacancies, will die for lack of nourishment before they can strike into the interior earth. Manure, grit, etc., must be mixed with the soil as the work proceeds. The outer spaces between the rocks need not be filled just now ; the "pockets" thus formed will be provided later on with either a richer, finer soil, or some special medium which may be required by certain plants. It is the bulk, or interior mass of soil that will eventually be called upon to support and feed the long, penetrating roots of the little plants that will be placed in the outside "pockets." Road-grit (not too much) is an excellent ingredient, and so is old mortar rubbish, for the main body of soil. If desired the frontal base of the rockery may be hollowed out and cemented, forming a conduit or basin into which water may drain ; or a properly-constructed pond may be made. But at the base of a rockery many moisture- and shade-loving plants will easily find a congenial home. I have in mind, in writing the above, just an ordinary suburban or town garden, and the ordinary, not too wealthy people to whom it would belong. Of course where the sparing of money, space, and material is no object, the safest, surest, and most effective procedure is to seek the aid of professional and therefore competent men in building a rockery.

Many gardens are situated entirely in shade ; others parti-

ally so. Where such a state of affairs exists, or where the ground is subject to great dampness, a Fernery should be constructed. It will drain the earth, for one thing, and enable the occupier to clothe it in exquisite drapery, instead of allowing the place to become a wilderness. If a Fernery is intended, the soil it is composed of should receive a good mixture of turfy material, peat, leaf-mould, manure, etc., and a generous proportion of sand. If advisable, the ground level may be lowered, the soil being banked up on either side; the site will then become even more shaded. Moisture is the essential element where Ferns are grown, in addition to shade—moisture not only in the soil, but overhead; therefore frequent waterings in dry weather must be the rule—unless you feel inclined to construct a pond in the lower level, with a fountain. A hose, and a revolving stand-pipe, such as is used for watering large lawns, will prove most effective, keeping up that constant humidity which many Ferns delight in. The roots are inserted into the “pockets” between the rocks, and they quickly push their way into the cool, moist soil in the interior of the rockery. The “pockets” may receive a compost of loam, peat, leaf-mould, and silver sand, but that is not necessary, unless some of the finer species of Ferns are desired. As for choice of subjects, there is certainly a fairly wide selection. The *Aspleniums* and *Polypodiums* are the most suitable. But an excellent way of stocking a Fernery is to purchase a quantity of Devonshire, Cornish, or Irish Ferns, of which advertisements appear in all gardening papers. A shilling or two will provide quite a respectable display. There are many other plants—especially waterside plants—that require shade and moisture, and can be grown on the Fern rockery. Some species of *Primulas* require a moist position; *Mimulus*—especially the native species (see Chapter XI)—*Creeping Jenny*, *Ladies' Smock* (particularly the double kind), *Meadow-sweet*, *Forget-me-nots*, etc., will do well. And last but not least must be mentioned *Osmunda regalis*, the magnificent Flowering Fern.

Nearly every race of plants nowadays has its Alpine representatives, and to neglect their cultivation is to lose many a beautiful flower ; the loss is intensified when it is remembered that some of the richest blues are amongst this class of plants.

Alpines and the Alpine Garden Of course it is impossible to give Alpines the same conditions under which they flourish in their mountainous habitats, but, by observing a few necessary rules, with care and attention, a good and effective imitation of the natural conditions can be secured.

In the construction of an Alpine garden—a rockery is probably the best form—due attention should be paid to the native resources and surroundings. Many Alpine plants, for instance, are covered with deep snow the greater part of the year, or exposed to the drenching rains and boisterous winds characteristic of high altitudes. These facts necessitate dwarf growth and a strong root-hold ; otherwise the plants would surely be destroyed.

Then comes the intense heat of the short Alpine summer, which displays their beautiful flowers. This powerful heat would destroy most plants ; but the sturdy Alpines successfully resist the sun's power, by reason of the far-reaching roots with which they are provided. Some of the smaller plants of mountainous regions, whose foliage rises less than a couple of inches above the ground, strike their roots many feet into the earth beneath, finding their way between the rocks, until they reach the soil made moist by the circulating water of melting snow.

Now this points to a most difficult problem—a situation exposed to the full power of the sun above, with a cool, moist root-run below. Therefore an Alpinery requires a position exactly the reverse from that of a Fernery. An eastern, south-eastern, or southern aspect will be found most suitable. The base of the rockery should be composed principally of retentive material, to hold the supply of necessary water for the roots. The mass of the soil should be of a sandy, gritty loam, and a small admixture of peat and calcareous material

will be beneficial, although the "pockets" in the rockery will form receptacles for the special soils required by some Alpine plants.

The most important factor, however, in the cultivation of Alpines is thorough watering—assuming, of course, a full exposure to the absorbing rays of the sun; and if this is done frequently in dry weather, success will reward the extra trouble.

There are few flowers more beautiful in their way than mountain blossoms; and, although for the most part of a dwarf nature, the plants are often by no means insignificant in foliage. The lovely blues of the Salvias, Gentians, Campanulas, and others are unrivalled; while the purple-blue blossoms of the *Anemone pulsatilla*, or Pasque Flower, with its handsome yellow stamens and ornamental fruits, is worth any amount of trouble in growing. Then there are pretty and curious everlasting, such as the *Antennaria* (Mountain Cudweed, and the Snow Plant), with their silvery or hoary leaves and pink flowers; the Edelweiss—who does not know the Swiss species?—a curious flower greatly prized. There are also other varieties of this plant—the Himalayan Edelweiss (*Leontopodium himalayanum*), the Siberian Edelweiss (*L. sibiricum*), and the Austrian Edelweiss (*L. transylvanicum*).

Several Alpine plants require a good proportion of peat in the soil to bring out their best points, and amongst these are the hardy Heaths (*Ericas*), Daphnes, *Linum alpinum* (Alpine Flax), *Ranunculus amplexicaulis* and *R. montanus* (Mountain Buttercups), Androsace (a charming group of Alpine plants, comprising many forms and colours), *Chionodoxa lucilae*, *Erythronium dens-canis*, *Helleborus niger*, and *Myosotis*. *Linaria alpina* (Toadflax) requires a generous admixture of sand; while, for the most part, other Alpine plants will adapt themselves to good garden soil.

Alpines also have their representatives among Aquilegias, *Cætheras*, Primulas, Saxifrages, Sempervivens, Silenes, Dianthus, Erigerons, Irises, Lychnis, Veronicas, Clematises (*C. alpina*, purple-violet), Geraniums (*G. argenteum*), Hepaticas, *Arabis*, and many others.

The charming little *Erinus* (white and lilac shades) is an Alpine, having the additional advantage of being evergreen. Alpine Poppies are beautiful little flowers in various colours, and there are several dwarf Asters suitable for rock culture. The Alpine Coltsfoot (a useful purplish-rose flower), and the Alpine Wallflower (*Cheiranthus alpinus*) should not be left unnoted; and the list could be extended by admitting *Alyssum saxatile*, Crocuses, Lily-of-the-Valley, Saponaria, Snowdrop, Rock Rose (*Helianthemum*), Arenaria, and Orobis (*Lathyrus vernus*), which requires rich soil.

CHAPTER XV

VEGETABLE CULTIVATION

NEARLY all vegetables can enjoy a deep soil, which is, moreover, in all cases a necessity in times of drought. Vegetables suffer greatly in hot weather, because they do not receive the artificial waterings that are usually given to the flower-garden, on account of the great labour entailed in the application ; therefore some provision for their sustenance must be made during such trying periods. Two great sources of moisture that can be placed at the disposal of vegetable roots are the "mulch" on the surface and the "humus" below. The former has already been described, and can be used extensively between the rows, first giving a thorough hoeing or forking.

"Humus" is a mass of fine vegetable mould—the result of decaying vegetation, etc., thoroughly disintegrated and powdered—which has the property of retaining moisture in reasonable quantity for a long period, thus providing a store of water into which growing plants may send their roots. This "humus" is present in all good soils—the greater the quantity the richer the soil ; and its provision when comparatively deficient—an easy matter—becomes therefore imperative. The simplest way of making this useful vegetable mould is to dig a hole or trench in a corner or waste portion of the garden, preferably hidden from sight. Into this hole is cast any refuse vegetable substance—leaves, trimmings (not wood), fleshy roots, and stalks—together with soot from the house flues, an occasional handful of lime and salt, poultry or other available manure—anything that will decay or become

desiccated ; over this accumulation may be poured house-slops, soap-suds, etc. This can be added to until the hole is full, when the excavated soil may be shovelled back over the mass and beaten down firmly. If such a heap might become a nuisance, the vegetable matter, lime, etc., may be buried deeply at intervals, wherever space allows in the garden. This can go on all spring, summer, and autumn, as the refuse becomes available ; then, in the following spring, the stuff can be dug out, spread evenly on the ground, and thoroughly mixed with the soil during digging operations. Such a procedure will keep the vegetable garden especially in good " heart," and will be found extremely useful in the cases of those vegetables which dislike fresh, strong manures, such as Carrots, Parsnips, Beet, and other tap-roots ; these subjects become tough, stringy, and covered with fibrous roots when fresh manure is applied to or moisture withheld from the ground in which they are grown.

The vegetable quarters should be deeply dug and heavily manured in the autumn, with a small quantity of manure and surface-digging in spring. The manure used in spring should be well decayed and short, and thoroughly mixed with the soil. If poultry manure is used, it must be buried deeply or allowed to stand a year or so before application to the ground, as it is very strong. The well-cropped vegetable garden can always accommodate an annual application of organic manure—in the autumn—as in many cases quick growth and development of leaf and root are essential, which are promoted by richly-manured ground ; whereas in the flower-border a more cautious application is needed. Vegetable and fruit soil will not get too rich if lime is freely used. The absorption of nutriment by gross-feeding vegetables and trees is enormous, and this nutriment requires frequent replacing. A good general artificial manure for vegetables—especially dug in as a surface dressing before planting or sowing seed—is kainit.

Rotation of crops is important. Vegetables of a similar nature should not be grown for two successive years on the

same piece of ground ; for instance, deep-rooting vegetables should be followed by surface-rooting kinds, and vice versa ; Cabbages should succeed Carrots, Parsnips, etc. ; Parsnips should follow Potatoes ; Potatoes follow Peas or Beans ; and so on. Each crop extracts certain chemicals from the soil which may be required by succeeding crops of the same order, and the absence of which would be detrimental to the latter subjects ; but if a crop of opposite habits is put into the ground, the chemical compounds essential to such vegetables are probably still present in the soil, not having been drawn upon by the previous crop.

All this cropping, however, must necessarily impoverish and exhaust the soil ; and manures applied each year make up in some measure the deficient food-substances, but not completely. To give back to the soil the chemicals which have been withdrawn by heavy cropping the operation of deep digging will do much ; the subsoil—especially that of clay—containing a large amount of nutriment awaiting liberation. Therefore, each year, a certain quantity of the subsoil should be brought to the surface to receive aeration and weather influences, and to be mixed with the top spit. Yet care must be exercised in this ; if too much is raised at a time the surface soil will become unworkable and ruined ; but by a judicious, gradual transference of top soil to bottom soil, and bottom to the top, a thorough mixing, aerating, and pulverizing will be accomplished, and a continual deepening of the soil result. To illustrate : One season the ground is trenched, the subsoil remaining in its place, but being thoroughly dug a spit deep, broken up, and well manured with fresh manure ; the succeeding year will find this subsoil in a modified condition, and the most friable portion can now be mixed with the top spit. In the third year another trenching should take place, this time digging deeper still, throwing the two well-conditioned spits out of the trench, and again going through the breaking-up and manuring process, this time attacking the untouched subsoil. If this method is repeated after a period of two or three years, much valuable chemical

food will be liberated, and, by exposure to atmospherical and chemical action, become available for assimilation by the vegetable tenants of the ground. It will not be out of place to emphasize again the advisability of moderation in applying organic and other manures, and to advocate cultivation instead. If confirmation is required of the wisdom of such advice, let the gardener divide a plot of ground of good general texture into two portions. Let one be heavily manured in the top spit—the prevailing custom with many gardeners ; and let the next plot receive a small quantity of manure in the subsoil. Sow both plots with Beet, Beans, Potatoes, or Cabbages. The heavily-manured plot can receive just ordinary, everyday attention as to weeding, earth-ing, watering, etc. ; but let the procedure for the other plot be the almost continuous use of the hoe—at every opportunity stirring, loosening, and breaking up the soil around the plants. Comparatively little water will be required, and with every application, or after a shower of rain, a slight dusting of a chemical manure of moderate action, or a mulch in hot weather should be given. I will prophesy the result with confidence of fulfilment : The manure-laden soil will produce large, coarse, tough, fibrous, stringy, or woody vegetables ; but the cultivated soil will yield moderately-sized specimens of a fleshy, symmetrical, sweet composition, a delight to the cook and a joy to the consumer !

This brings me to lament the tendency—as in everything else—to large-sized vegetables : enormous Potatoes, which are floury and seductive enough on the outside, but which refuse to succumb to the softening effects of the boiler where the interior is concerned ; weighty Onions, which are too large to be used at one cooking operation, and are therefore looked at askance by the cook ; lengthy Carrots and Beetroots, containing more fibre than flesh ; enormous Cabbages which ought to boil down like Marrows, but which remain leathery under the most expert treatment. These are grown to please the eye—and the vanity of the grower—not to tempt the palate or assist the digestion. Those who grow vegetables

for eating purposes should eschew mammoth strains and be content with producing literally "fruits of the soil"—flesh without fibre, of moderate size but sweet withal.

Sow seed thickly; thin out to an inch apart after a few days' growth; then take note of the strongest and healthiest-looking seedlings, remove others to the extent of leaving six or more inches from plant to plant, according to the nature of the subject, and grow those that remain for all they are worth! Twenty well-grown, fair-sized vegetables are preferable to, and will go further than, fifty or more of inferior calibre; therefore, do not crowd too much into your vegetable quarters.

I have just space enough to discuss some of the best and most useful vegetables, their culture and treatment; and to make but passing—though I hope useful and profitable—reference to others.

Potatoes require a very loose, friable soil in which to develop; a medium wherein the tubers may expand without

Potatoes encountering much resistance. This becomes very evident and plain by considering the amount of space required by even one tuber only. Potatoes displace a great amount of soil in their development, and when much pressure is experienced, as in pushing their way through hard and unyielding ground, the tubers perforce adapt themselves to the limited surroundings and cramped quarters, and consequently remain small or are greatly deformed. Of course there are varieties amenable to a heavy soil; nevertheless, no Potato, however accommodating, can possibly flourish in an ungrateful soil unless serious modifications are made in the consistency of such soil. But let no one be deterred from attempting to grow Potatoes on heavy land; this is a comparatively easy matter, if careful and thorough tillage is undertaken.

It is a notorious fact that the Potato prefers cultivation to manurial stimulation. The secret of successful Potato-growing lies in a constant stirring of the soil—from the first appearance of the purple-green shoot to the final earthing-up; together, of course, with scientific preparation in the

way of hard, deep digging or trenching. Manure (preferably artificial) is best applied as an incentive to tuber-development when that stage of growth makes itself apparent. Certainly a small distribution of superphosphate at planting-time is beneficial and wise ; but an extensive use of soot, wood-ash, flue-dust, etc., will bring good results. Heavy land can be made applicable to Potato-growing by the continual use of the hoe or fork between and around the rows and plants. First provide plenty of loose, roomy material in the immediate vicinity of the "set," and afterwards continue such provision by hoeing, stirring, and digging around the resulting shoots and plants. I have grown excellent Potatoes in a sticky clay soil by first taking out a rather deep and wide drill, and putting therein a layer of ashes, soot, road-sand, leaves, etc., then planting the "sets," finally covering them with a few inches of similar material. Thereafter my energies were devoted to incorporating road-scrapings, ashes, etc., with, and thoroughly chopping and pulverizing, the soil surrounding the rows, gradually drawing the loose earth about the shoot as it appeared above the ground. Thus the whole of the soil between the rows became thoroughly loosened before being used for earthing-up.

It is always advisable to add a slight dusting of artificial manure to the soil which is being drawn around the plants—never add fresh or questionable manure ; and every shower of rain should always be taken advantage of as a help to reducing the more obstinate lumps to a better consistency. Mark, next year, the effect which this has had on the soil ! In fact, Potatoes are one of the best means of breaking up unfavourable ground in a profitable manner. Looseness, agitation, and airiness, then, are the main requirements of the Potato, generally speaking. The sets, I consider, should not be planted more than from four to six inches deep in any reasonable soil ; and, moreover, should be drilled, in preference to being dibbled. Potatoes will grow to fair size in ashes only, with an occasional dose of liquid manure ; this fact indicates at once the kind of medium which this useful

tuber requires. An excellent method of planting Potatoes is to dig the ground after the manner of trenching—first taking out and carting away the soil from a shallow trench, then breaking up the subsoil (adding well-rotted manure thereto, if thought desirable) ; this will raise the subsoil almost to the level of the surface of the ground being dug. On this well-pulverized subsoil, then, may be laid the sets, afterwards covering them with the top soil of the next trench ; and so on, allowing, of course, sufficient space between the rows. This is especially advantageous in heavy land, as the earth lies more or less loosely around, beneath, and above the Potato "set" and the subsequent root-development is just what is required.

There is no advantage in planting too early : rather the opposite. See that the sets are well sprouted, and the sprouts exposed to the light until they are purple and commence to emit fine rootlets. Then they will show through the ground a few days after planting, and also will mature earlier.

A good Potato manure should have its bulk composed of superphosphates, and a smaller proportion of sulphates (of ammonia and potash) or guano. Beware of applying lime directly to Potato ground ; and if you desire a good, floury tuber, do not use manures that contain a large proportion of nitrate of soda, which tends to make the Potatoes of close and waxy texture.

The Onion is a vegetable which requires great depth of soil and a perfect drainage, the bulb formation being indis-
**The Onion
and Its
Relations** solubly dependent upon compactness of the ground (which, however, does not mean hardness or im-
penetrability). It must be remembered that, as all compact soils especially need thorough drainage, provision must be made for such drainage beforehand. This provision comprises extra deep digging and trenching, for one thing (which in itself often proves sufficiently efficacious), and the incorporation of porous substances with the soil. Plenty of "humus" is essential, especially in the surface spit. All manures (and well-rotted pig, cow, horse, fowl, or any other

strong manures may be used, as Onions are gross feeders) should be well dug into the bottom soil, for Onions produce very long roots, and will send them down a great way to find food. The hoe must be freely used whilst the crops are growing, weeds rigorously deleted, and as much space as possible given to each plant. Water, soot-water, and liquid manure should be freely applied when the Onions are swelling, and the soil kept from covering the bulbs. Onions require a mulch in hot, dry weather ; horse-droppings can be used, but must be well pulverized.

So far as seed-sowing is concerned, the bed on which this is done should be made very firm by beating with the "flat" of the spade, or treading with the feet ; but if the soil is of a sticky nature, a wide plank or board should be laid on the newly-dug surface, and then walked upon, and the operation continued over the whole bed until all is firm and level. Always sow thinly, on moist—not wet or dry—soil.

Autumn sowing produces the finest and the strongest (especially in flavour !) Onions ; but those who prefer a mild Onion should sow seeds in boxes early in January, and raise the plants in heat, afterwards pricking them out into other boxes or frames, gradually hardening off and finally planting out as soon as favourable weather and the state of soil allow. Ordinary spring sowings, in March, will result in fair-sized Onions for general cooking purposes. Thin out well, using the "thinnings" as "spring" onions. If for pickling, sow on poor soil and do not thin out.

Old Onions, which have commenced sprouting, may be placed in any vacant ground, and in a short time will divide into several mild and sweet "scallions," useful in salads. Large Onions may also be grown from small "sets" planted at springtime.

Shallots, Garlic, and similar members of the Onion family may be given a like treatment, varying it according to the quality of produce desired. Plenty of ash, soot, and similar material may always be incorporated in soil devoted to the Onion tribe.

So far as manure is concerned, that of an organic nature must form the bulk of the food store ; artificials should be applied as stimulants to quick growth or aids to maturity, and are often not required. There are several excellent special Onion manures on the market.

All "tap—" or long-rooted vegetables, such as Parsnips, Carrots, Beetroots, etc., must have a very deep and friable soil to produce straight, tender, good-sized roots ; otherwise they are not worth growing. The **Tap-rooted Vegetables** tendency of these subjects is to send their long, tapering roots straight down, far into the soil. I have seen roots of Parsnips, for instance, which have resembled long lengths of thick cord ! A shapely root must be encouraged as far as possible. One thing which will induce this desirable state of affairs is the placing of all manures in the subsoil as deeply as possible ; no fresh or strong manure should be put into the top spit. If the bulk of the manure is placed in the surface soil, the roots, finding no necessity to push their way very far down, will send out adventitious or supplementary rootlets in all directions in order to absorb the conveniently situated food. But this does not contribute to the well-being of the root ; it spoils its symmetry and tenderness : whereas, if the greater part of the food material is far below the surface, the roots will run straight down to seek it ; and provided the soil is of the right texture, clean, straight roots are the result. When obstacles in the shape of hard soil, stones, etc., are met, forking takes place. Surface feeding, by sparingly hoeing in artificials and applying liquid manure during the whole period of growth, may be resorted to, where it is considered necessary ; and in dry weather liquid manure will probably prevent a catastrophe, for absence of moisture induces the roots to throw out a mass of fine white fibrous rootlets all over their surfaces, thus irremediably spoiling them.

There is a system of growing tap-roots upon ridges. I have tried it, and have found much to recommend it—in wet seasons ; in dry weather, however, a good deal of labour is

entailed in the application of liquid. Upon heavy soils this system might prove an advantage, as a larger ground-surface is exposed to the influences of light, air, and the weather, which would certainly be beneficial ; but I doubt its use in light soils, except in damp or shaded positions. The roots certainly grow very straight and (if sufficient moisture is maintained) very clean, and, of course, are of great length. The procedure consists in throwing up a ridge, after the manner of earthing-up Potatoes, drawing a drill along the apex, or top, of the ridge, and sowing the seeds therein. The seedlings must not be allowed to suffer for lack of moisture, and need not be thinned out so severely as on level ground ; in fact, the roots, when fully grown, may almost touch each other in the rows without detrimental effect. There is this to be said in favour of the ridge : weeds are less troublesome there, being fewer in number and easily dealt with ; there is a larger surface on which to catch the rainfall, with excellent and rapid drainage (this is why the danger of over-dryness may become acute in times of drought). There is also greater ease in harvesting—less liability to damage the roots—a boon where Beetroots are concerned. The trench-like spaces between the ridges may be utilized for growing Lettices, Radishes, Turnips, Spinach, Cabbages, or Broccoli. Any one who can give the necessary attention as to watering, etc., will find the ridge system a profitable method of growing tap-roots.

Those gardeners who do not have much success with long-rooted vegetables, on account of unsuitable soil, should grow

instead the "turnip" or round varieties ; or,
Turnip-rooted Vegetables at least, a goodly proportion of them. These useful vegetables are most suitable for shallow soils. They are, moreover, usually of very quick growth, and therefore tender ; not really intended for storing purposes, they are used as they mature.

The varieties of Turnip-rooted Beet form one of the best examples of this class. Of dark colour, less liability to bleed, easily harvested, and of early maturity, these useful Beets are indispensable. A fine ornamental edging for both vege-

table and flower borders can be secured by dropping seeds two or three inches apart. They will grow practically everywhere, and the smallest roots may be used. Sow the seed successively, in rich friable soil, beginning a little earlier than in the case of long-rooted Beet.

The same may be said of the Shorthorn and stump-rooted Carrots. There is also a short or round-rooted variety of Parsnip ; but this I cannot recommend.

Turnip-rooted Celery (*Celeriac*) is a useful vegetable, with which may be classed Turnip-rooted Parsley and Turnip-rooted Chervil—the whole three partaking of the aromatic flavourings of their respective parent plants. They are of fairly easy growth, requiring a rich soil of no great depth. The seeds of Celery must, however, be sown in heat, after the manner of Celery, and afterwards planted out on level ground, and kept in a fast-growing condition by cultivation and attention to moisture. Turnip-rooted Parsley demands but an ordinary outdoor culture, the seedlings being thinned out well. Liquid manure and a regular use of the hoe will assist in forming good roots. Turnip-rooted Chervil seed, on the other hand, is of a slowly-germinating character, and if it is not sown immediately it is ripe it may lie in the ground quite a year before it germinates. Even when ripe seed is sown in the autumn it does not sprout until the following spring. Apart from this, the culture of this most excellent vegetable is simple. These three subjects should be tried by all who appreciate a change in vegetables, and who like delicate flavours.

While we are on the subject of vegetables of a Turnip-like form, we must not forget the Kohl-Rabi—the Turnip-Cabbage, which combines in its Turnip-like base above ground the flavour of both its parents. Its culture is easy in a rich soil, and its cooking and eating qualities are excellent.

We have made frequent use of the name of our humble friend the Turnip ; let us consider this popular vegetable. It requires, first, a well-dug soil, no fresh manure, and a situation not too dry or exposed. Plenty of soot dug into the

soil is beneficial to growth, and a dusting of the same material will probably save the plants from an attack of the Turnip-fly. A soil which has been well manured for a previous crop suits the Turnip admirably, and a position between taller-growing subjects is one of the best ; but it certainly must not be too much overshadowed, neither should the sun be blocked out. Turnips are usually badly-grown, and often require strong digestions to cope with them ; but if a quick, steady, healthy growth is kept up, and plenty of moisture and a frequent dusting of artificial manure (superphosphate) are given, sweet, fleshy roots will result.

It is as well to note that round-rooted vegetables must be encouraged to make quick, continuous, unchecked growth, to bring out their highest points of excellence.

Although leguminous vegetables are, for the most part, fibrous-rooted, and therefore root near the surface, a deep, well-worked soil is essential ; but do not apply **Leguminous Vegetables** fresh manure, or more wood and leaf than fruit will be the result. Leguminous plants store up among their roots, and in the adjacent soil, a large amount of nitrates, which considerably enrich the ground for succeeding crops ; yet they will assimilate much nitrogenous food, and really require it.

BROAD BEANS—That soil is best which is rich, moist, deep, firm, well-manured ; but Broad Beans can be grown in any good soil. Sow three inches deep, four to five inches apart, the rows to have quite three feet between. They may be sown successionaly from February onwards ; or earlier, indoors, and planted out after. Pinch off the tops of the plants to prevent attacks of fly, and to hasten maturity.

RUNNER BEANS—The Scarlet Runner is a perennial, and roots may be lifted and stored till next season. Hang them in bunches in a dry cellar or shed, or store them in sand. They can be left in the ground if protected by a thick layer of ashes. Sow one inch deep, six inches apart. The plants may be first raised indoors, if this is preferred, and transplanted when fine weather arrives. The soil they demand is one that

is rich and deep, with subsoil well manured. Plenty of water is required in dry weather. This advice stands good for other Beans of similar habit. There are many Runner Beans which are never seen in this country, but which would delight both gardener and cook. None of them are hardy.

DWARF OR KIDNEY BEANS—These include French, Dutch, Belgian, Swiss, and other sorts, and there are scores of varieties, a few only of which are under cultivation in this country. They are most tender in constitution, and seeds cannot be planted until frost has gone for certain ; they may be forced under glass, however, at any time of the year. Outdoors they may be obtained well in advance of the Scarlet Runner type. Plant one inch deep, six inches apart. A rich, previously-manured soil is essential, also liberal moisture, especially liquid manure, as Kidney Beans are gross feeders.

This catalogue does not exhaust the different sections of Beans ; there are many others. The Japanese Beans, like most subjects from Japan, are very handsome and interesting ; and the Dolichos, or Asparagus Beans, are excellent subjects for greenhouse decoration, one especially, the Lablab, or Egyptian Bean, producing pretty indigo blue flowers and peculiar-shaped pods.

Beans are surface-rooting (and also deep-rooting) subjects, and require much moisture ; this is best given in the form of a mulch. A liberal use of the hoe is essential and profitable. Lime, basic slag, and nitrate of soda are the best artificials for Beans.

PEAS—This popular crop, although rooting at the surface, yet also sends its roots into the ground for a considerable depth ; a fact which points to deep trenching and subsoil manuring. But Peas require much moisture, especially in dry weather, and drought affects both haulm and seed greatly, often ruining the crop. This must be provided against—unfortunately, I consider—for, if rainy weather comes instead of drought, an undesirable state of things is created. The provision against drought consists in taking out a deep trench (the deeper the better), and placing therein a foot or two of

moisture-retaining materials : strawy manure, leaves, vegetable refuse, chopped turf, etc., anything into which the roots may descend to find moisture ; and the soil with which the trench is filled should be very rich, friable, and containing " humus " in large quantity. This system works well in hot seasons ; but in wet summers the trench becomes surfeited with water, and either rots the roots or causes the plants to run to haulm and leafage instead of producing Peas. It would be far better, in my opinion, to take out a trench of two or three feet in depth, digging into the bottom some fresh stable, pig, cow, or poultry manure ; then, as the soil is returned to the trench, mixing with it some well-rotted manure, sewerage, or decayed vegetable refuse. The ingredients should be thoroughly incorporated with the soil, and they should be in a pulverized, rotten condition, so as to mix readily. This will form a " humus " in the soil, if carried out in the previous autumn (it can be easily decided at that time which part of the ground shall contain the Peas in the approaching season), and will go far, with the assistance of the manured subsoil, towards combating the drought ; and should the season prove to be a wet one, the ground will not hold the moisture to such a detrimental extent as a mass of manure would do, because the drainage would be complete and effectual. As an aid to this procedure, the trench should not be quite filled—six inches or more should be left empty ; and the depression thus formed will also help to retain moisture. In such a soil the seeds may be sown fairly thickly ; scatter them widely in the drill, so as to give each plenty of room. Some varieties, however, make a great quantity of haulm ; the seeds of these must be sown thinly. Let the rows run, as near as possible, from north to south, to allow the sun to gain admission ; and they are best placed many feet apart—especially the taller varieties. Seeds may be sown successively from February to July and August. Earlier sowings may be tried, but must be regarded as experimental. Do not incorporate fresh manure with the top spit. Chemicals are useful in the fruiting stages ; nitrate of soda and basic slag may be beneficially used, and if the ground

is well limed a greater yield will result. Soot, too, and vegetable and wood ashes may be used on the surface, especially at sowing time.

The different varieties are legion, and I will not attempt their discussion ; but the tall sorts should never be employed in a small garden—two and a half to three feet will be quite high enough ; and many of these in favourable weather will outstrip their reputation for height. The dwarf varieties are very prolific, and the “marrow” kinds should be given the preference.

The general requirements of the Cabbage tribe are moisture, coolness (provided by shade), and rich, firm, deep soil. Seeds are usually sown (on prepared beds) in spring for summer and autumn use, and in autumn for winter and spring use.

CABBAGES—These are too numerous to deal with exhaustively, but briefly it should be remembered that hearting Cabbages of all kinds require a very firm, almost hard soil ; otherwise they run to leaf or seed instead of forming hearts. The ground should have been very heavily manured the previous autumn, if intended for the spring planting, and beaten or trodden very hard. The plants must be dibbled in firmly and well watered ; and the subsequent culture is accomplished with the watering-can and the hoe. Quite one and a half feet must be allowed from plant to plant ; or, if set more thickly, as in the case of small, quick-growing kinds, every other Cabbage must be removed early for consumption, leaving the rest to attain maximum size. Sow the seeds in spring (March) on beds of rich soil, transplant to other similar ground, and finally plant out. Sow again in mid-summer ; these will be useful in late autumn. The autumn sowing, transplanting, and setting out must be undertaken with a view to the plants standing through the cold winter : this entails quick, sturdy growth (no “coddling”), and planting on very compact, well-trodden soil, with plenty of room. Soot may be liberally used as well as wood ashes, flue-dust, etc. Nitrate of soda promotes quick growth, and may be used beneficially in small

doses to stimulate activity in the spring, thus bringing on to early maturity those plants which have stood the winter.

The Coleworts and Kales are coarser and hardier Cabbages, and are sown in April for use in autumn, winter, and spring. They are treated as above described, and are very useful indeed.

Savoyes are excellent winter Cabbages, with crinkled leaves and crisp, white, and very firm hearts. Sow in March.

Brussels Sprouts require soil of a firm, rich character ; fresh manure must be avoided, or large, broken sprouts will result instead of the small, firm ones so desirable. Lime applied to the soil is very beneficial ; also soot and burnt rubbish. A very firm planting and subsequent vigorous use of the hoe are most essential. Give manure and soot-water in dry weather, but beware of overfeeding. This may produce large sprouts, but the flavour will be inferior.

The Portugal, Chinese, and other little-known Cabbages partake more of the character of Lettuces, but are very delicate and worth growing.

THE BROCCOLIS—These are divided into sections for cultural purposes, the first division being those which, sown from March to May, mature during the following autumn and early winter. Walcheren may be quoted as an example.

The second division may include those which are grown solely for winter use, and which require protection from wet and frost. The seeds are sown in early April and May. Snow's Winter White and Early Sprouting are good sorts.

Those in the third division are sown in April and May, making steady growth through summer, autumn, and winter, and mature in March and April the following year. There are many good varieties of this class, which include the well-known and useful Purple Sprouting Broccoli, a vegetable which ought to be in every garden, great or small.

The fourth division are sown in April and May of the first year, and do not mature until April and May—and sometimes June—of the next. These make very large heads, as a rule, and are most excellent.

The seedlings must be pricked out early into rich nursery beds, grown steadily on, and prolific rooting encouraged. "Stocky" plants only should be used; those which have become drawn and spindly through overcrowding are of no use whatever. This applies to all the Cabbage family. Do not break the roots when transplanting, and water freely until well established. Plant very firmly on hard ground. A deeply-dug or trenched soil is a necessity to Broccoli; it must be very rich, firm, and well drained. Use plenty of well-rotted stable or cow manure. To protect Broccoli which are forming or have formed "flowers" during hard weather, tie the outer leaves over the "flower," lift the roots a little with a fork, and press the plant over on its side. Don't forget to use the hoe, especially towards maturity and in the initial stages of growth.

CAULIFLOWERS—A rich, stiff, but highly-cultivated soil will suit Cauliflowers. The ground must be trenched and manured in the autumn, thrown up in ridges and left for winter's frost, winds, and rains to work their will upon it. Cauliflowers will run to seed in hot weather, and therefore early sowing becomes a necessity; this means sowing under glass. Cauliflowers, moreover, are tender vegetables, and will not stand rough, cold weather. Sow seeds in slight heat in the beginning of February, prick out into another frame or box, and plant out (firmly on hard ground) at the end of April or May. These will be ready to cut in July and August. Also sow in a frame in autumn, winter under glass, and plant out in early spring. Give frequent and copious supplies of water and liquid manure, and do not allow the slightest check in growth to occur.

CELERY—This excellent vegetable is often grown on land entirely unsuited to it. A well-dug, very friable soil is absolutely essential to grow Celery to perfection, to say nothing of a glut of manure and moisture-retaining materials. The trenches are often made too deep, and not wide enough. The best soil is that which has just been cleared of early Potatoes, Peas, or Greens.

**Vegetables
grown in
Trenches**

It should, notwithstanding its disturbance by lifting the previous crop, be well dug—even trenched ; it cannot be made too friable. Then the trenches are taken out, a foot or more wide and about a foot deep—or less, should the soil be unfavourable—the excavated earth being packed into a ridge on either side of the opening. Next the bottom of the trench must be dug deeply and plenty of good manure incorporated therewith. It is a good plan to pour a few pailfuls of house-slops, etc., into the trenches for a day or two before the plants are inserted.

Celery is raised from seed, sown under glass in brisk heat, and the resulting seedlings are pricked into other boxes and hardened off. They will benefit by being transplanted into a bed of very rich soil outdoors and allowed to grow on sturdily before finally planting out, which takes place in June, and preferably in showery weather. Place the plants in the middle of the trench, water well if the weather is dry, and shade for a few days—a very easy matter : a newspaper held down by stones stretched across the trenches will do. When the Celery begins to show well above the trenches, tie some raffia very loosely round the stalks, drawing them well together, in order to keep out dirt, stones, etc. ; then chop up the ridges very finely, and earth the plants up to the green tops. During the whole course of growth Celery must never lack water, especially liquid manure—sheep, fowl, horse, cow,—soot-water, house-slops, etc.

LEEKES—These excellent vegetables are accorded exactly the same treatment as Celery. I have heard of a method of shortening both roots and leaves at the time of planting, and cutting back the leaves several times afterwards ; but I have never tried this. It is said to be productive of large specimens.

CARDOON—Sow seeds of this delicious vegetable in gentle heat in March, harden off gradually, and plant out at the end of May in trenches containing rich soil, quite two feet apart. Treat much the same as Celery. This vegetable is little known in England ; but, when properly cooked and served, it forms an excellent dish. The blanched stalks are used.

TOMATOES—So much has been written in other books and journals on the culture of the Tomato, and by far more expert

Vegetables under Glass pens than mine, that I hesitate to attempt minute directions for growing these delightful vegetable-fruits ; I will therefore content myself with making a few observations from a standpoint of my own.

First, as to soil. In this matter different growers may have different views ; but, speaking generally, the Tomato, which belongs to the Potato family (*Solanum*), is very similar in requirements to its tuberous relative : i.e. it demands a soil containing plenty of potash, porous, fibrous, and sandy. One difference between the two subjects is that Tomato ground must be compact and firm. Tomato plants, like Potatoes, will grow in damp ashes only ; but, of course, fruits are wanted as well as growth.

For outdoor culture the situation must be a sunny one, yet protected from cold winds, and a well-drained, compact soil is essential. An old cinder-path, broken up and manured, makes an excellent Tomato-bed. But indoor culture is always preferable, and the fruits are of a far richer texture.

Tomato plants must be planted very firmly, whether outdoors, in the glasshouse border, or in pots.

The constitution and habits of the Tomato are worth studying, and much can be learned therefrom. If a handful of damp manure is placed upon the ground around the stems of a Tomato plant, and removed a few days after, it will be seen that the stems have emitted several thick, white rootlets. This teaches us that Tomatoes are very sensitive to surface-feeding, and also indicates at once the line of action the grower should take. If the ground has been well manured below, and the plants have been firmly inserted therein, they will grow strong and sturdily until the appearance of the first truss of flowers. Now comes the strain of fruit-bearing, and with it a demand for extra food. A mulch, for preference, is placed upon the ground, and both manure-water and clear water are freely given ; the stems will respond by pushing out a network of surface-roots, which will absorb the rich food. Almost

any portion of the stem of a Tomato will emit fresh roots, and either form into a new plant or help to sustain the old one. Advantage may be taken of this to grow Tomatoes in frames, pegging the shoots into the soil, of course avoiding over-crowding. Side-shoots will strike readily, and form excellent little plants. I once slipped accidentally in my greenhouse, and cut the stem of a Tomato plant almost in two, whilst tying it to a support. The plant was bearing fruit well, and it seemed a pity to lose it. I therefore opened out a cardboard cream-pot, such as is supplied by dairymen, tied it round the stem, and filled it with damp sand. This was quickly full of roots, and the plant above continued to bear fruit !

EGG PLANTS—The Egg Plant (Aubergine) is another member of the Potato family, and requires similar treatment to the Tomato in the matter of sowing seed and raising plants : i.e. sowing seed under glass, early transplanting, and final placing in permanent quarters. These latter may be under glass (in pots, where the plants become very ornamental), or in a warm, sheltered border outside. The fruits are of many shapes and colours, and are put to the same uses as Tomatoes. Apart from this, they form extremely decorative greenhouse plants, and for that reason alone are most valuable.

CUCUMBERS—This is another subject that could be enlarged upon and detailed to any extent, did space allow ; but

I would advise the amateur to rely upon actual experience in growing Cucumbers, rather than upon mere instructions. This experience will be gained probably by repeated failures. A good, moist bottom heat is essential for growing Cucumbers—not a violent heat, however, but gentle and continuous—if grown in frames or in unheated greenhouses ; in the hothouse, however, this bottom heat is not necessary. Fibrous loam, leaf-mould, rotten manure, in equal parts, make a good compost for top-dressing. For the bulk of the soil a stiffer compost is essential, and is gained by allowing a double proportion of loam to the above mixture. Where necessary, bottom heat may be provided either by hot water or air pipes

or by fermenting materials. Cucumbers do not require a large root-run. Liquid manure as well as top-dressings are essential, but the water should be poured on the ground quite six inches from the stem of the plant. Syringing the whole plant, however, is beneficial. Give plenty of air on fine days, but do not let the temperature get lower than 65 degrees. Always use tepid water.

Outdoor culture is effected by forming a hot-bed of fermenting materials, and covering this with about one foot of rich, fine soil. Water the plants with tepid water, and shade—preferably using a handlight—for a few days after planting. The Japanese Cucumber is an excellent sort for outdoor work. As a climber it is very ornamental.

MELONS—These require much the same treatment as Cucumbers, with the exception that the plants must be managed so as to secure the setting of as many fruits at one time as possible, for melons do not bear continuously like Cucumbers. To ensure this, stop the lower side-shoots at the first joint; this produces a number of second shoots, which will develop flowers exactly at the same time as do the first-formed upper side-shoots. Then the fruits set and mature together. Melons, unlike Cucumbers, must be hand-fertilized.

VEGETABLE MARROWS—It is a mistake to suppose that a hot-bed or rubbish-heap is essential to the successful growth of Marrows, although in hot seasons it is helpful. These vegetables, however, may be grown on any rich soil if kept well supplied with liquid manure; indeed, the latter is the chief factor in successful cultivation of these popular subjects.

PUMPKINS OR GOURDS—I wonder why these splendid giants of the vegetable garden are not more widely grown than they are? They require only a fermenting manure or rubbish-heap, a layer of good, rich soil, and copious supplies of clear and manure-water. Their leafage is handsome, and makes an unsightly corner of the garden a mass of delightful dark-green foliage and shining yellow fruits. If nothing else, it is decidedly curious to see the enormous balls of fleshy

substance, and watch their development from the flower to the ripe fruit. The Pumpkin is not to be despised either, from a culinary point of view: as a supplementary ingredient in pies, especially with Apples, it is delicious; and as jam, preserve, or pickle it is of excellent use and quality. A couple of plants at least should be found in every garden. Seeds are sown in gentle heat.

ORNAMENTAL GOURDS—These are pretty, curious, and useful climbing plants, after the manner of Marrows, and may be trained amongst flowers, along fences, on trellis, arches, pergolas, etc. They will grow anywhere and anyhow. The shapes and contortions are remarkable—round, pear-shaped, club-shaped, bottle-shaped, cup-shaped, warted, smooth, striped, slashed, twisted, curved, etc.

SPINACH—This is an excellent medicinal vegetable of most easy culture. Grown between taller vegetables it revels

Other Vegetables in moisture and richness of soil, and requires constant cultivation. It is very liable to run to seed; therefore must be grown quickly and well. Summer Spinach is sown successionaly from February to August. Winter Spinach is sown at the end of July and August in well-manured soil, and thinned out six to twelve inches apart. Vigorous surface-cultivation results in larger leaves.

It is impossible to do justice to such large subjects as Artichokes, Asparagus, or Seakale, in this book; therefore a very short résumé of cultural points must suffice.

ARTICHOKE—The “Globe” section requires a rich, black, turfey soil, kept well moist. Plants may be raised from seed, or propagated by division or by young shoots. Protect the stools in winter, and renew plantations every four years. The “Jerusalem” kinds will grow almost anywhere.

ASPARAGUS.—A light, well-drained soil is essential to grow this vegetable successfully. Plant at no great depth, and in autumn cover with good farmyard manure. The application of lime or chalk is beneficial, as is also sea-salt. Three-year-old plants should be purchased, or the plants may be raised

from seeds. This is a greedy subject and must be well supplied with manure.

SEAKALE—This vegetable is propagated by root-cuttings, or plants may be raised from seed. The soil must be well dug and manured. To blanch Seakale, cover the crown with a large inverted flower-pot (or a "Seakale pot"), and cover the whole with leaves, litter, etc., or manure. Plants may be forced indoors. As Seakale is a seaside plant, common or sea salt may be mixed with the soil with great advantage.

CHAPTER XVI

SALADS AND HERBS

SALADS include such subjects as Lettuces, Radishes, Endive, Cress, etc. They all require an exceptionally rich soil and plenty of moisture, in order to ensure very quick, unchecked growth ; otherwise they become tough, stringy, and strong in flavour, or they run to

Salads seed and are spoilt entirely. Of the rarer Salad subjects may be mentioned Land Cress as an excellent substitute for Water Cress. Sow at any time, thin out or transplant, and water well. Water Cress itself may be grown without water, but will be rather "peppery" ; undoubtedly many people would like it. Corn Salad, the leaves of Chicory, Sorrel, Dandelion, Chervil, and Nasturtium may all be pressed into service in the salad-bowl. (See also under Herbs.) Purslane is a quick-growing herb, the succulent leaves of which can be gathered two months after sowing. Sorrel gives an acid flavour to salads ; a sprig or two of Chervil imparts an aromatic taste ; whilst Nasturtium leaves afford a touch of piquancy, and may take the place of Cress. Salad Burnet is a Herb which effectively supplies the place of Cucumber, so far as aroma is concerned. Rampion leaves and roots are also useful. The raw tubers of the Jerusalem Artichoke are an excellent addition to a Salad, in place of Radishes, when sliced. Chives are used for mild Onion flavours.

Herbs ought to be grown more than they are in our British gardens, not merely for edible purposes, but for the delicate

Herbs and penetrating perfume which they nearly all provide. A bunch of Herb sprays will give out quite as much scent as many flowers do, and, moreover, agreeable scent, which cannot be said of all flowers. Their useful-

ness in other directions is great, although, it must be confessed, but little taken advantage of nowadays, which is a pity ; for among them are found flavours—piquant, acid, and sweet—which would add greatly to the pleasantness of many a dish or meal ; besides, herbs possess a medicinal value not to be despised. As seeds may be obtained in penny packets, there is no reason why every garden should not have its herb-bed, which will contain several things of great utility to the household. Taken as a whole, Herbs require a rich, deep, well-drained, but moist, somewhat light soil.

The following is a list of Herbs, with abbreviated notes concerning culture and characteristics :—

ANGELICA—Biennial ; 4 ft. ; soil : rich, moist, deep. Leaves and leaf-stalks are preserved in sugar.

ANISE—Annual ; 1½ ft. ; soil : warm, well drained ; Celery-like ; fast grower. Seeds, of delicate flavour and perfume, ripen in August.

BALM—Perennial ; 1½ ft. ; easy culture ; bushy, spreading, lemon-scented. Seasoning and perfuming.

BASIL—Annual (half-hardy) ; 1 ft. ; soil : light, rich, moist. Seasoning, perfuming, medicine. White flowers in clustered spikes.

BORAGE—Annual ; 1 ft. ; handsome spikes, blue flowers ; suitable flower-border. Decoration, garnishing, cordials, claret-cup.

SALAD BURNET—Perennial ; dwarf ; seed sown in spring and summer ; flowering not allowed ; cut leaves with knife, to obtain succession ; cucumber-scented. Salads.

CAPSICUM—Treatment as Egg-plant (Chap. XIV). Many kinds, colours, shapes ; ornamental pot-plant. Piquant, hot. Flavouring, pickling, sometimes as a vegetable.

CARRAWAY—Annual ; 2 ft. Long roots (carrot flavour) are cooked ; leaves and shoots used in salads ; seeds aromatic, used in confectionery.

CHERVIL—Annual ; like Parsley. Garnishing. (Turnip-rooted : see Chap. XIV).

- CHIVES**—Perennial; onion-like tufts and flavour; propagated by division in March. Seasoning, flavouring.
- CLARY**—Very ornamental herbaceous perennial, used in flower-garden; leaves tipped different colours. Seasoning.
- CORIANDER**—Annual; 2 ft.; soil: warm, light; seeds (sown in autumn and spring) are used. Flavouring.
- DANDELION**—Well-known weed. Cultivated, used in salads and medicine.
- DILL**—Annual; 2 ft.; soil: warm, well drained; mint-like flavour; seeds (sown in April) used in pickles and (powdered) as a condiment.
- FENNEL**—Perennial; 5 ft.; Asparagus-like foliage. Garnishing fish, etc.
- HOREHOUND**—Perennial; common native plant. Cough mixtures, herb-beer, etc.
- HORSERADISH**—Perennial; long-rooting; propagated by pieces of the crown being pushed into dibbled holes. Should be grown on the “ridge” system (Chap. XIV). Excellent sauce for beef and other meats; pickles.
- HYSSOP**—Perennial, evergreen shrub; spikes of blue flowers; likes lime, chalk. Garnishing, herb-beer; very bitter taste.
- HOPS**—Well-known, perennial, ornamental climber. Beers, etc.
- LAVENDER AND ROSEMARY**—Two old-fashioned, sweet-smelling bushes; should find a place in every garden. Grow practically anywhere, especially delighting in chalky soils. Used for seasoning sometimes; and for the manufacture of perfumes.
- POT MARIGOLD**—Well-known, easily-grown plant; flowers used in culinary preparations.
- MARJORAM**—Pot: perennial; 2 ft. Sweet: annual. Both used for seasoning, and very popular.
- MINT**—Several varieties, all well known, and in most gardens. May be forced under glass all year round. Sauces, flavouring, drinks, medicine, etc.
- PARSLEY**—Biennial. Seed is sown in spring for summer use;

in June for winter. May be grown during winter under glass; slow germinating. Deep, well-manured soil necessary; very little water; seed-bed firm. Used for garnishing. Many varieties—curled or moss sorts best. (See Chap. XIV for Turnip-rooted Parsley.)

PURSLANE—Green, Golden, Winter: annuals; seed sown spring and summer, in light soil, broadcast. May be cooked like Spinach; but excellent in salads.

RAMPION—Biennial; good soil. Roots like long Radishes, white and crisp. Leaves used in salads. Produces in its third season—after the manner of Canterbury Bells—sheaves of beautiful small campanulate flowers; may be transplanted previous to this, from kitchen to flower garden. Roots eaten raw.

RHUBARB—Of great medicinal value and easy culture. Rhubarb should be allotted a spare corner and given liberal treatment.

RUE—Perennial; 2 ft.; well-drained soil; easy culture. Unpleasant in perfume to most people; used to be in vogue for seasoning, but is now neglected. Very bitter and pungent, and has medicinal value.

SAGE AND THYME—Two well-known perennial plants that require to be little spoken of. One plant of each will be sufficient in most gardens. Both propagated by cuttings. Flavourings, sauces, forcemeat, etc.

SAVORY—Summer: annual; sow April and May, in good, light soil. Leaves and shoots used for flavouring. Winter: perennial; 1 ft.; well-drained soil. Uses as above.

SKIRRETT—Perennial; 3 ft. Forms roots, thick, sweet, and floury, somewhat like a Dahlia tuber. Seed sown autumn or spring; well-manured soil; abundance of water required; roots boiled as vegetables.

SORREL—The cultivated kinds have very large leaves, useful in salads, grown readily from seeds; likes moist soil, plenty of room. May be boiled as vegetable. Perennial; acid flavour. Really worth growing.

TANSY—Perennial; 3 ft.; grow anywhere. Leaves used for seasoning.

TARRAGON—Perennial; of easy culture; possesses very delicate aromatic flavour. Protect roots from frost by leaves or manure. Flavouring, seasoning, and Tarragon vinegar.

WODDRUFF—Perennial; likes shade; ornamental. When dried the plant emits a very pleasant perfume.

WORMWOOD—Perennial; 3 ft.; easy culture. Used for flavouring.

Herb seeds are sown exactly as are those of vegetables and flowers. The perennials may mostly be increased by division or cuttings, and old plants should be cut down each year to promote fresh growth. All herbs should be gathered for storing just after flowering, and thoroughly dried.

Herbs also contain several tap-rooted subjects, which may be used as vegetables, such as Skirrett, Rampion, Chervil, Parsley, Carraway. These form practically a set of new vegetables that are known by taste to very few in this country, and grown by fewer still. To them may be added Salsafy and Scorzonera, two excellent vegetables, the former with oyster-like flesh and of easy culture; while the latter has the advantage of standing for two years or more, the roots meanwhile increasing in size but remaining tender. All the above require a very deep, rich, well-cultivated soil. Their leaves also can be used as salad ingredients, and for cookery.

CHAPTER XVII

THE CULTIVATION OF FRUIT

IN the cultivation of fruit a curious state of things occurs : the roots must be provided with a deep soil, yet should be prevented from going down into it ! The explanation, however, is simple. The soil must be deep, to allow of efficient drainage ; this benefits the roots of fruit trees by keeping the ground sufficiently moist, warm, friable, and well aerated. If the roots are allowed to push down deeply in their search for moisture and food, however, they often strike into a cold clay or water-laden subsoil, which is too deep to be affected by drainage, and this is productive of growth of wood and leaf, but not of fruit. It is astonishing how far down the root of a tree will go. The production of fruit being the object and the reason for the existence of the tree, this tendency to produce wood and leaf must be combated. Much may be accomplished at planting-time, by first securing trees or bushes with plenty of fibrous roots, but with little or no tap-root. This done, the development of tap-roots can be prevented by the placing of hard substances underneath the stool, to make the downward trend impossible.

Soils and Manures The next point is the encouragement of fibrous roots. The procedure consists in making the surface soil as rich as possible, by carefully digging in supplies of well-rotted manure in autumn and spring, by the use of artificials, and the provision of mulches in summer and winter, which may be profitably dug into the soil afterwards. Clear and manure water should be provided in abundance in the summer and during any dry weather. It is often the case that, although the

ground looks fairly moist on the surface, the roots beneath are starving for lack of moisture, so great is their suction.

So far as soil is concerned, good, mellow garden ground is excellent ; but any soil, even sticky clay, can be fitted for fruit culture by suitable manipulation, described elsewhere in this book. A cold clay subsoil is a bad possession where fruit-growing is concerned, and must be circumvented, possibly even to the extent of providing a concrete bottom for the trees to rest upon ; roots will naturally go downwards in search of food and moisture, and in such a case they must be induced to stay near the surface, where moisture will be of a warm, airy nature ; below, in the clay, it is cold, wet, and poisonous.

The site of a fruit garden depends upon local conditions. As a rule, fruit trees are grown largely in kitchen gardens.

**Situations,
Aspects, etc.** This is an excellent and profitable plan if the depletion of food substances by the trees is liberally replaced, as it affords to vegetables that shade and protection from weather conditions which they require. But good fruit cannot be grown in an exposed position ; shelter from the north and east is essential in many districts ; and whether it be the regulation orchard or fruit plantation, or the kitchen garden with a tree planted here and there, there is no better or more appropriate protective hedge (in several senses) than that composed of the Myrobalan Plum. This useful subject forms a thick, spiny hedge, impenetrable to beast or man in three or four years after planting ; and although it rarely fruits, except in southern parts of this country, it is quite hardy. If, at intervals, a strong stem is allowed to rise above the hedge, it can profitably be grafted with Plums of any variety.

Trees are best planted so that they get the full benefit of a south or west aspect ; and the distance apart should be as great as possible, so as to allow free access of light, air, and the rays of the sun—to themselves as well as to the plants that may be grown beneath the trees.

If a tree is planted properly it will grow well, bear well,

and become a source of profit and joy to the owner. On the other hand, a tree planted badly is the cause of much disappointment and waste of time, labour, and money. First of all, never cut the roots to fit the hole, but make the hole large enough to accommodate the entire ball of roots, with room to spare. After the site has been determined upon the earth should be excavated to a good depth and width, and a layer of broken bricks, slates, stones, mortar rubbish, etc., should be thrown into the cavity, and all well rammed down. Do not put any manure in the bottom of the hole. Now shovel in a foot or so of the excavated earth, and upon this place the roots of the tree. (It requires two persons to plant a tree properly—one to hold it upright in its place, and the other to fill in the soil.) While the tree is held upright, the roots must be spread out evenly and widely all around and radiating from the stem. See that there is no doubling or twisting or matting—it makes all the difference to the health and vigour of the tree. Should there be any damaged roots, cut the broken or bruised part away with a very sharp knife ; and if any of the thicker roots show signs of a downward trend, and refuse to be disposed horizontally, they had better be removed with a saw. Be careful to make no jagged cuts—all must be straight and clean. A stake may now be driven into the ground near the stem of the tree, taking care not to injure the roots. Having arranged the latter in order, the soil can be replaced. A quantity of good, well-rotted manure may advantageously be incorporated therewith. As the earth is shovelled around the roots, the person holding the tree should shake it gently with backward-and-forward and up-and-down movements. This allows the earth to fill in between the fine roots, and penetrate to every part, so that there are no spaces left around the roots. As the work proceeds, the earth should be trodden, or rammed down, until the tree is firm, and can stand by itself. The earth should come just above the junction of the roots with the trunk, and no farther. The stem should now be tied firmly to the stake in such a manner that the bark is not injured.

Newly-planted trees may have a mulch of strawy manure placed over the roots to preserve warmth and moisture until established. Plant any time from October to March, in weather neither too wet nor too dry.

Wall trees should be planted quite one foot from the wall, and these will require plenty of manure and water at all times of the year, because such a position will certainly be extremely dry, unless greatly exposed to the weather.

Always stake newly-planted bush or standard trees.

From the very first, cultivation must be the rule : breaking up, stirring, hoeing, weed-destroying, manuring, watering are the essentials which form a continuous round of operations where fruit trees are concerned.

Efficient pruning consists in putting a check on wood and leaf development which would take the place of fruit formation.

Pruning This is effected by shortening the young shoots, and by cutting through tap-roots. It is easy to overdo pruning ; sound judgment and careful observation are necessary to determine where and how to prune. Haphazard cutting and chopping brings failure. There can be no hard-and-fast rule laid down, but, as a guide, the shoot may be cut back to the sixth bud from the base in the summer, and finally to the third bud in the winter. Summer pruning or pinching is done to throw the vigour of the tree into the development of a few good buds, instead of a number of weak ones ; and at the winter pruning a selection of the best shoots is made, and these are cut back to three, four, or more buds, according to the constitution and habits of the tree. The amateur should study the latter, as they will teach him far better how to prune than all the instructions that could be given. He should also learn to distinguish between fruit-buds and leaf-buds ; between fruiting-spurs or branches and leafy, immature shoots. Otherwise the cutting away will prove the destruction of the fruit.

Other reasons for pruning are the disposal of new shoots and the dying down of old wood. When the shoots become interlaced, crossed, and twisted they block out light, and

prevent free access of air and sunshine. These shoots must be thinned ; the badly-placed branches removed entirely ; others cut back ; others again encouraged, and left to grow. All old and useless wood should be removed at once ; not, however, if it continues to bear good fruit in abundance. It must be remembered, too, that different trees bear fruit in different places on their branches, and this must be considered in pruning. The cut must always be in an upward direction, clean, slanting, and with a sharp knife, just above the bud. Burn all prunings, and spread the ashes on the ground around the trees. The time for winter (or final) pruning is roughly from October to February, the latter month being the best for inexperienced gardeners.

Old trees that have become very dense in growth should have some of the branches—even the larger ones—removed, and especially those that show signs of dying off. Where necessary, the head of the tree may be cut off entirely, when the trunk, as a rule, will put forth fresh branches and bear fruit again. Do not destroy old trees until you have flourishing young ones to replace them.

In the case of established trees, and also in young stock that makes leafage instead of fruit, the roots probably require

Root-pruning pruning. This is accomplished by lifting the tree or excavating the earth around it, so as to expose the roots. Then every root that exhibits an inclination to grow downward instead of horizontally is sawn or cut through cleanly close to the stock. Moderation, however, must be the rule here, as elsewhere ; excess often brings disaster ; for a tree, however flourishing, receives a serious check when suddenly and at one operation it is deprived of the roots that have been its chief support. Therefore it is best to sever the roots on two successive years on one side of the tree only, rather than to cut away the whole. This gives the tree a chance to recuperate ; it will form a mass of fibrous roots near the surface where the severance has been made, for it still has some vigorous tap-roots to depend upon. These fibrous roots effectually take the place of the

removed tap-root, and are the kind calculated to induce prolific fruiting.

There are far too many useless fruit trees in our gardens. When a tree refuses to produce fruit abundantly, in spite of rational treatment, it should be removed and replaced by a more likely subject. Fruit trees are cheap enough nowadays for this to be done without entailing much expense. This procedure should be the rule in the case of a tree which bears an inferior kind of fruit, or one that seems prone to insect and disease attacks. Clear out all hopelessly rampant and truculent youngsters, and aged derelicts ; but certainly not until every opportunity has been afforded them of mending their ways.

The fruits should always be thinned, as the possession of a few well-formed, well-matured fruits is infinitely better than

Thinning a number of misshapen, insect-eaten, half-ripe specimens. A slight thinning should take place while the fruits are yet young ; and a final selection made when those to be removed are advanced enough to be used for cooking, etc.

In gathering, care must be taken not to bruise the fruits, or they will not keep. A bright, dry day should be chosen,

Gathering and the fruits must also be dry and quite ripe. Store in a dry place, none of the fruits being in contact. Remove all those that are decaying, bruised, or insect-eaten. Also protect from frost.

In the small garden, where space is limited and precious, and where the growth of large fruit trees or bushes would be

Espaliers to the detriment of the more lowly occupants of the garden, the "espalier" saves the situation, as it allows the small gardener to grow and enjoy fruit in his cramped surroundings without having to sacrifice other quite as necessary things. An espalier is a trellis, or row of stakes, to which trees are tied and trained horizontally. This form of fruit tree is convenient and economical of space, allowing light, air, and sunshine to penetrate to the surrounding soil, even to its own roots—which does not often happen with trees

of other forms of training. The advantages of the espalier include the easier fertilization of blossoms by insects, wind, etc., on account of the greater access afforded ; the full benefits of the sun, air, rain, and light ; the earlier and surer maturing and more complete ripening of the fruit as a consequence ; ease of gathering ; and, last, but not least, a decidedly ornamental appearance at all seasons, even in winter, for the well-trained tree, although denuded of leafage, stands out conspicuously and artistically against other objects around. Truly the espalier is the small gardener's convenient form of fruit tree and may be freely used without fear. Gooseberries, Currants, Plums of all kinds, Cherries, Apricots, Peaches, Figs, Apples, Pears, Quinces—these can all be utilized, and from them a substantial selection may be made. The espalier is best placed alongside the garden path—especially that of the kitchen-garden, where it forms an excellent light screen or hedge, and will also protect tender vegetables against cold winds, and give just that thin shade which some vegetables rejoice in.

Any young tree with its shoots suitably grown can be trained espalier fashion. Choose trees that show a promising number of oppositely-disposed side-branches ; cut away all those protruding towards the front and back (not the fruiting-spurs, however). Now drive stakes into the ground a foot or two apart along the line you wish the branches to travel, and tie securely thereto the shoots, which can be as long as you wish. Shoots may be trained from the bottom of the main stem upwards (unlike those grown in bush or standard form, the trunk of which is usually kept bare of growth for a desired distance from the ground). The varieties which are to be specially recommended for this treatment, and which will thus produce larger, cleaner, and riper fruits, are Gooseberries, Red and White Currants, Raspberries, Loganberries ; all other fruits, of course, may be treated likewise, but they can, as a rule, well sustain themselves in cordon or fan formation, without assistance of the espalier. Yet the last is to be recommended for the first few years of growth, until

the trees are established. The main points of culture are the very wide disposal of the shoots; no overcrowding; no crossing or interlacing; and a persistent training and pruning into correct shape.

There are such a number of fruits under cultivation that all sorts and conditions of tastes, likes, dislikes, and fancies may be satisfied; all kinds and grades of soil and situation may be accommodated; great or little space, and all manner of climates may be suited. I have room, however, for a few notes only on the different fruits, and especially those which are of fairly easy culture. The detailed particulars governing the cultivation of such choice fruits as Peaches, Nectarines, Grapes, etc., I have left severely alone, as a fragmentary treatment such as this book might afford would be worse than useless.

The notes appended will convey a good idea to the reader of the particular cultivation and requirements of various fruits, and help him to make a selection to suit the means and soil at his disposal:

APPLES—These fruits are of easy culture and not very exacting as to soil. A good, mellow garden loam suits them; but almost any land will grow Apples. It is worthy of note that, of the many kinds, some bear fruit upon spurs, others at the tips of the branches. This should be inquired into when purchasing trees, as it influences greatly the treatment and pruning to be meted out to them. Those varieties that bear fruit on the ends of their shoots are usually not very bushy in habit, having their branches thinly disposed, and making but little wood; this is an advantage in crowded quarters. Apples can be grown in any form, and, being strong feeders, can take plenty of manure both on and mixed with the surface-soil. Fibrous surface-roots are essential to the production of fruit and should be encouraged.

PEARS—This is an uncertain fruit, and the trees require frequent root-pruning to prevent running to wood and to induce fruit-formation instead. Summer-pruning the young shoots is a good means of securing the latter result; and if the

trees threaten to become overcrowded some of the branches should be removed. Pears do exceedingly well on walls and fences, and as cordons and pyramids. Like the Apple, the Pear fruits sometimes on the tips, sometimes from spurs of the branches. Liquid manure and water are required in hot weather, and a well-manured soil is essential.

PLUMS—This heading may include all stone fruit of a Plum nature—Greengages, Damsons, etc. In clay subsoils the trees require a good deal of root-pruning. As a wall fruit or espalier the Plum gives good results ; and, I think, better than standards. The latter often get out of hand and the fruit cannot be gathered properly, falling a prey to birds, wasps, etc. Plums require careful pruning ; they are benefited by applications of liquid manure in the fruiting season, and require a rich soil, the lighter the better. Potash is a good artificial manure for all stone fruits.

CERRIES—This is another good wall or espalier fruit, especially the Morello variety (which fruits upon the young shoots : these must not be pruned). The Cherry requires an open situation, occasional root-pruning, plenty of liquid manure, and a rich soil. Some Cherries make a good deal of wood, and much of it requires removal. Finish pruning by October, as later pruning induces “gumming.” These fruits are so subject to the depredations of birds, especially thrushes and starlings, that a standard tree often loses the best of its fruit ere it can be gathered ; therefore, small trees, or those on the cordon system, should be grown, which can easily be netted or otherwise protected. A west aspect is good for Cherries.

Peaches, Nectarines, Apricots are fruits more suitable for glass than outdoor culture. If planted outside, a position against a south wall must be given them, to which they are trained cordon fashion ; and a glass shelter built into the wall overhead is conducive to success. When well established, these fruits often give a good account of themselves in the open. Much root-pruning is required during the earlier time of their growth after planting. But, generally speaking,

the culture of these fruits outdoors should be left alone by the amateur who cannot give them room under glass.

FIGS—If a warm south wall or corner sheltered from cold winds is available, these subjects may be tried with much hope of success, for their culture is easy. A sandy, gravelly soil will suit the trees, and they prefer a dry situation ; a wet, cold subsoil is fatal. Frost must be guarded against ; a canvas, matting, or other covering should be loosely fastened over the stems when severe weather threatens. The only pruning required by the amateur is the shortening of the shoots on which the fruit appears, to hasten its development and ripening.

GOOSEBERRIES, with their prickly branches and spreading habits, are often a nuisance in small gardens, although most profitable where plenty of space can be given. In a limited space the espalier Gooseberry is undoubtedly a boon. This fruit is so easy to grow, and the bushes are so amenable to training, that they are most suitable for planting against walls, fences, or for training in espalier fashion. Too many branches should not be allowed ; old wood must be cut out regularly and new wood encouraged, but kept well pruned. The bushes should be trained into cup or inverted-umbrella shape, to admit light and air. Gooseberry trees form huge masses of fibrous roots, of which care should be taken when digging in manure—which the bushes must have in abundance. Fork in the manure in early winter, and prune in March or February.

CURRENTS—Very few gardens there are that cannot accommodate a few specimens of these hardy and popular fruits ; yet they are often grown badly, and thus spoilt. The aim should be to secure a few large, well-filled bunches of fruit, rather than many indifferent, undersized ones. For this reason, espalier-training has much to recommend itself to the gardener ; training to standard or bush form gives good results, but horizontally-disposed shoots receive the benefit of light and air, which it is difficult to secure for other manners of disposition. Black Currants are best trained in bush form, selecting each year the young wood, and cutting the old away ; encourage growth from the outward part of the bush, leaving

the centre open. These fruits are often attacked by the Currant mite, which forms galls in the buds and destroys incipient fruit ; the only safe course is burning the bushes. Red Currants may be had as standards, bushes, or espaliers. I certainly favour and recommend the last, especially to gardeners with limited space ; they may be also trained to walls and fences. These Currants fruit on "spurs" on the old wood, and the young wood requires severe pruning to induce spur-formation. Bushes are pruned into "cup" form, leaving the centre well open ; also cut severely back to the "spurs" on the main stems. The latter method may be adopted with espaliers, encouraging a few main stems to make as long a growth as they will, clearing away all young shoots, except where there is room for a new stem formation, when the shoots available can be saved and tied to the supports ; also in the case of those replacing old, worn-out wood. White Currants are choice dessert fruits, and may be treated in the same way as the Red. Both Red and White Currants are very ornamental, and when in fruit on thinly and well-disposed shoots are fit subjects even for the flower-garden. They make enormous masses of fibrous roots, which require constant applications of strong manures.

RASPBERRIES are such gross feeders and such persistent travellers that only a fairly large garden should give them room ; small gardens would have their nutrient pretty well drained from them by the rapacious and hungry fibrous roots. Raspberries, however, assist in breaking up heavy and plastic soil. They require a large supply of manure, much watering, and mulching. A light, sandy loam suits them to perfection. Planted in October and November, the canes, after fruiting, should be cut down to the ground and new growth encouraged. Espalier-training is excellent for small gardens. Three or four shoots from each root can be tied fan-shape to stakes, and give good results, or they may be tied to stretched wires in rows. White or Yellow Raspberries are a delicacy, and are, I think, to be preferred to the red.

STRAWBERRIES—These are sun-loving plants. They may be grown as fancy dictates, for they are very accommodating—as edgings, on banks, in pots, boxes, tubs. The ground should be well manured, dug deeply, and replanted with young stock every three years ; all runners should be removed, if not wanted to form new plants ; and top-dressings of rich soil and well-rotted manure, together with copious waterings in a dry season when fruit is forming, are the principal cultural requirements outdoors. Place clean straw between the rows to preserve the fruit from contact with the ground. Indoor cultivation is more complicated, and can only be undertaken by the possessor of a heated structure.

Those who have a taste for "fancy" and new fruits should try a few of the following :

MULBERRIES may be treated like Figs—trained to a wall, with shoots, thinly disposed, pruned back to the "spurs." Standards do not always ripen their fruit.

STRAWBERRY-RASPBERRY—This new fruit will thrive in any good soil, which must be kept moist and mulched. It is useful for jellies and jams.

BLACKBERRIES are useful for covering unsightly fences ; are easily grown, and require little attention beyond keeping within bounds.

LOGANBERRIES—Any one with a rich, light soil will succeed with these fruits. They require good cultivation, attention as to watering, mulching, and training. They are both ornamental and useful.

QUINCES are easily grown, and the trees are handsome, whether in leafage, flowers, or fruit. Treat like Apples or Pears. They impart a unique and pleasant flavour to pies, etc., and make excellent jam.

NUTS—A few of these constitute an ornamental and useful adjunct to a garden, even of small dimensions, if kept well in hand by constant and careful pruning. Filberts make excellent screens, especially when disposed espalier-fashion, and will grow anywhere. Walnuts may be mentioned ; they require a good, strong rich soil.

Apples, Pears, the choicer Plums, Peaches, Apricots, Nectarines may be grown in pots or boxes under glass. Ten-inch pots are suitable. The tree is planted (firmly) **Fruit** in the autumn, leaving a good space from the **under** rim of the pot or box to accommodate top-dressings (**Glass** given, say, each October). The pots are plunged in ashes to over the rim, outdoors, in a sheltered but sunny position, as soon as planted and in November each year after. The base on which the plunged pots stand must be well drained. Then, in March, the pot is taken indoors, the tree is pruned, and kept supplied with water and liquid manure. Syringing to keep free from insects is necessary. Maintain the shoots well disposed and uncrowded, pinching them well back. The blossoms must be hand-fertilized. Syringe freely until the fruits are well developed ; also supply manure-water frequently until colour begins to show, when clear water is to be substituted. These are but an outline of general instructions ; the amateur should secure a good book, or personal instruction, on the subject.

CHAPTER XVIII

INSECTS, FUNGOID DISEASES, ETC.

INSECT pests will ruin the best of gardens in a very short time ; but there are means for reducing them to vanishing-point, if persevered with. Among plants that have been attacked by insects the weakest-growing will always succumb, whilst a strong, vigorous plant will

Insects probably outgrow whatever damage may have been inflicted upon it. This points very plainly to stimulation and encouragement of healthy growth to secure immunity from loss by insect depredations. It is therefore the first thing to ensure. One of the best stimulants is nitrate of soda, not only for its invigorating effects upon the plants, but also because it is poisonous to many larvæ that prey upon roots underground. But be careful to use it sparingly and often, and on no account allow it to come in contact with the foliage or fine roots, as it means their destruction as well as that of the insects. Kainit is another combined stimulant and insect-killer. With these, as well as with soot, salt, soap-suds, and lime the ground may be beneficially treated before cropping commences. Gas-lime is so strongly poisonous and injurious to everything in and on the ground that its use prohibits cropping for many months ; therefore it should be used only where stern necessity for drastic treatment arises—i.e. when the soil has become so infested with insects and disease that profitable cropping becomes impossible.

Besides the operations of collecting, spraying, and killing the insects, that mentioned above of stimulating the plants

to luxuriant growth will alone often ward off evil effects without further effort, and should be tried first. It will be found that dressing the land in the autumn with some of the materials above mentioned is the most effective way of ridding the soil of the larger insects, and others that hibernate underground. When the garden is badly infested, trenching will frequently remedy matters ; the larvæ and eggs, being thus buried deeply, cannot make their way to the surface, and therefore perish.

Decaying rubbish is a great insect-breeding ground. Everything of the kind that is not immediately useful in the garden should be either burnt or buried ; in the latter case deeply, and well sprinkled with lime and soot, as has been elsewhere advised.

Hand-picking, trapping, etc., is the small gardener's safe and sure method, and can be effected in many ways—inverted flower-pots and jars filled with hay and moss, above ground, and pieces of Potato, Carrot, etc., below ground, are excellent traps ; and a vessel of boiling water, or a solution of carbolic acid, should accompany the gardener when he examines these traps, and the captured insects may be promptly immersed out of harm's way. Earwigs, wireworms, leather-jackets, grubs and pupæ of all kinds, caterpillars, beetles, bugs, etc., may be thus dealt with ; while a strong solution of brine will be found useful to drop slugs into. Lime-water will kill worms where they are too plentiful or undesirable (on the lawn, for instance), although the humble earthworm may be looked upon as a friend rather than a foe.

One other antidote to the activities of the larger insects is a small pen of fowls of the "vigorously-scratching" kinds : Leghorns, Minorcas, Hamburgs, Houdans, etc. It is wonderful the number of insects these lively birds will dispose of. A movable enclosure composed of netting, containing three or four fowls, can be placed on vacant ground throughout autumn and winter during the day-time, the birds retiring to their sleeping quarters in the evening. A couple of tame fowls allowed on the land whilst digging is proceeding, especi-

ally at a time when the bare state of the garden dispels fears of the damage they might otherwise do, will relieve the soil of innumerable undesirable inhabitants, give the fowls the insect food they naturally require, and manure the land as well.

The smaller insects—aphis, for instance—undoubtedly present the greatest problem. They swarm in prodigious numbers, they multiply to so alarming an extent, and with such frequency, that at the best of times their riddance seems only temporary. Syringing is the best method of dealing with these pests; and when a plant or branch is badly infested its removal and burning will probably save the rest. It should be remembered that, in making insecticides, some ingredient of a sticky nature must be incorporated, or the liquid will not adhere to the insects, and will not have the desired effect. Soft soap is the best material for this purpose; and mixed in boiling water with such things as paraffin, carbolic acid, quassia chips, it forms an excellent consistency, which will not leave the insects until it has caused their destruction. Washes may be made and applied with a brush, if desired. Such materials as tobacco, lime, and sulphur mixed with hot water, are very effective; and so are pastes formed of flour, to which the above ingredients have been added. Whatever may be used should be applied with caution. Weak solutions applied often are better than one strong composition which certainly kills the insects, but destroys the plant as well. Always be moderate when using poisons or corrosive fluids. Paraffin and carbolic acid especially should be much diluted. Soapsuds are useful to sprinkle over large bushes or plants infested with minute insects. Soot, sulphur, and tobacco powder are three good insecticides for application in a dry state, especially under glass, although fumigation by burning the materials is easy of accomplishment indoors.

If foliage that is susceptible to insect attacks be sprayed with dilute emulsions of soft soap and paraffin, carbolic, or quassia chips, it will become distasteful to the insects and act as a preventive. These mixtures are fatal to aphis on

Roses, Beans, Cabbages, to flies in Celery, Carrots, Onions, Parsnips, to red spider, etc., etc.

An important factor in the elimination of insect pests is the rigorous destruction of weeds. Many insects have a particular liking for certain cultivated plants, and are often attracted first of all by weeds belonging to the same order or family as their favourite garden food. Hence such things as Shepherd's Purse or Charlock will become infested with the turnip-flea, and when the cultivated Turnip puts in an appearance the insects transfer their attentions and themselves to it immediately. Therefore the early destruction and removal of weeds become imperative.

It is a waste of time and money for the ordinary gardener to attempt to cure disease by spraying, etc.; rather, he should

Diseases accomplish its prevention, by careful and clean cultivation. With the large or the market gardener it is different. The best remedy for disease of any virulent nature is burning the subject attacked, and replacing by fresh stock. Gooseberry mildew, Potato blight, Currant galls (the work of an insect), Hollyhock disease—all kinds of blights, rusts, scales, scabs—should be unmercifully treated by fire. It is the safest, most economical method. It cures, and it prevents. But if the gardener is careful, and treats his ground as it should be treated—intelligently and practically—insect and fungoid pests will occur as accidents instead of as necessary accompaniments to his labours.

CHAPTER XIX

WEEDS

GENERALLY speaking, weeds are plants which have congregated in places where their presence is not desired, thereby creating themselves a nuisance ; thus any plant, however valuable under orderly cultivation, may easily transform itself into a weed by encroaching upon land intended for the habitation of other subjects.

But the plants to which the term "weed" is usually applied are distinctly separated from the other members of the vegetable world by their almost complete lack of the useful or ornamental qualities which characterize most plants ; to which must often be added a naturally ill-favoured, ragged, and insignificant appearance. They are the outcasts of vegetation. Their mission, apparently, is to destroy ; for, being parasite plants, they prey upon their more useful companions, either by robbing the soil of its nutriment or by choking the plants themselves out of existence.

So strong, so persistent is the attack of weeds that, if unchecked by the gardener, little hope is there of the garden's becoming anything but a desolate waste.

The very term "weed" is suggestive of contempt and utter meanness. And the appearance of the plants themselves amply justifies the feeling of abhorrence and enmity extended towards them, apart from their destructive power ; but a closer acquaintance and some examination reveal a marvel of creation which excites the wonder and astonishment of the observer. For they are admirably equipped for the part they play in the earth's destiny. Insect pests have

their terrors, but the persistency and tenacity of weeds surpass those of insects in deadly effect.

The extermination of weeds is a problem that will probably never be solved, except on a limited scale, and there are reasons for this. In the first place, the constitution of weeds is of a hardy nature ; it withstands everything—heat, cold, wet, frost, mutilation, even fire—for the half-burned root of a Dock or wild Convolvulus will live and shoot, if placed under the soil again ; also, if a weed is pulled up, left to shrivel in the hot sun, cut to pieces, or otherwise ill-treated, it will revive and grow once more should a kindly shower of rain intervene before its vitality is quite exhausted.

As an auxiliary to this robust make-up, the capabilities of weeds to adapt themselves to climate and soil conditions is another force to be reckoned with ; and for this adaptation the plants are provided with extraordinarily developed means of resistance. For instance, they are amply protected against the two extremes of drought and wet.

To combat the first they are provided in some cases with very long tap-roots, which penetrate into the moisture-laden subsoil, thus supplying the growth above with liquid food. Others have leaves of a hairy, sticky nature, which attract moisture from the air ; others again possess fleshy roots, leaves, or stems, which contain enough water to sustain life for a considerable period.

They nearly all provide themselves with an efficient natural drainage—where such is necessary—principally by means of fibrous roots or underground travelling stems and suckers, which keep the soil around the plants in a friable, porous condition, thus effecting a thorough filtration of surplus water.

Weeds have also great powers in resisting destruction. For example, if the pulling up of an established Dock is attempted, the result is only a mass of sticky leaves in the hand—the root remains firm, the stems only yielding ; but these sticky leaves create enough disgust to discourage the removal of the plant by pulling it up. On the contrary, other roots will break off readily—being jointed, or extremely

brittle—leaving portions in the soil to remedy the injury by forming new plants. Some plants, also, possess stinging or thorny leaves and stems ; others are nauseous—all of which qualities denote resistance to destruction or attempted elimination. For this same reason they are immune from attack by cattle ; in fact very few creatures will attempt to eat weeds, for, besides the foregoing protection, these plants mostly possess bitter or unpalatable flavours.

But while the general make-up of weeds is wonderful, their varied means of reproduction is more so, the most remarkable being that of the Composite order of weed-plant, of which Thistles, Dandelions, and Coltsfoot are examples. The seeds of these plants are tipped with a tiny ring of fine, downy hairs, which, when ripe, are shaken by the wind or some other agency from the seed-stalks ; but not to fall to the ground. The ring of down expands in the air, like a parachute, and the slightest of breezes is sufficient to carry it upwards, there to be caught in a stronger current of air. The seeds are sometimes carried miles in this fashion, to be deposited, by a shower of rain or sudden cessation of wind, upon some unfortunate gardener's newly-dug or carefully-planted plot, and, unsuspected by him, to form the basis of a fine bed of weeds, to the detriment of his choicest crops. On a fair day in summer hosts of these parachute-seeds may be seen leisurely floating in the air.

Other seeds are so minute as to be almost like dust, and, when the seed-pod bursts, they are discharged into the air, and also carried by the wind to considerable distances. This bursting of the seed-pod is prevalent among the larger-seeded weeds, thereby scattering the seeds far around the parent plant, and thus ensuring plenty of room for each youngster when the seeds germinate and grow.

Animals often disseminate weeds by reason of the hooks, sticky hairs, and bristles of some classes of seeds clinging to their fur ; birds on the wing drop them ; while the gardener himself in his digging operations often unconsciously brings them to the surface, there to germinate and grow.

Weeds are enormously prolific seed-bearers. A single small plant, such as the Shepherd's Purse, has been known to produce fourteen thousand to fifteen thousand seeds annually ; and if only a dozen plants of such a weed are allowed to form seeds in a cultivated plot, the hosts of resulting young plants will certainly present a formidable barrier to successful gardening.

Now we come to the question—How can we best attack such insidious, unyielding, unrelenting, almost indestructible enemies as weeds are proved to be ? Several methods of extermination suggest themselves, and every one involves enormous labour to carry out ; but the one that seems to stand out prominently as the most effective is prevention of seeding.

Annual and biennial weeds may be thinned to a great extent by systematic destruction before the flowering stage is reached, and in time could probably be banished from a district by this means ; but perennial weeds are a source of much anxiety and perplexity among cultivators, for every hedgerow, ditch, and all untenanted soils teem with them and with their tenacious roots. The process of eradication would be slow and painful.

There is one remarkable condition, however, which might be put to good account, and that lies in the fact that a natural enemy and destroyer of weeds is grass—the finer sorts, of course—with which may also be associated mosses and lichens. This can be proved by first noting that few weeds occur in virgin grass land ; and that secondly, when this virgin soil is broken up, weeds appear and flourish ; then, if allowed to relapse into its former undisturbed state, the grass encroaches, weeds are choked out and gradually disappear, until the land once more has reverted to pasture. Weeds grow only on cultivated land, or land broken up for any purpose whatever by man or beast ; in fact, a cultivated soil is as essential for weed-growing as for vegetable or flower culture.

The eradication of weeds may be accomplished to a certain

extent, but their entire elimination from the soil is a task of such magnitude as to become an impossibility. There has been much said concerning scientific research into the means of exterminating these undesirable plants, and hinting at the discovery of a kind of serum wherewith to inoculate and poison out of existence all answering to the name of "weed." But the nature of the weed will have to be changed first; for anything applied to the soil to kill and prevent the growth of weeds will also assuredly kill and prevent the growth of more valuable plants. And individual application of poisons would be a task equalling the famous cleansing of the Augean stables. The only remedy is spade-work—the frequent use of the hoe, the prevention of seeding, and the successful inducement of your neighbour to follow your example.

CHAPTER XX

LAWNS AND PATHS

I SHOULD like to devote this chapter to a little chat upon a few generalities and odds-and-ends that help in the successful management of a garden, large or small.

The use of grass in the garden is very desirable, and a good, velvety lawn is a delight and luxury worth striving for. But do not sacrifice the garden to the lawn ; do not attempt a lawn if there is no room for one, or no means to keep it in good condition ; but have a lawn, however small, if possible. A plot of grass is very refreshing, and an excellent setting for the flowers in the borders, enhancing and emphasizing their beauty and brilliance. Many suburban and town gardens, however, are really spoilt by the presence of too much grass, often untidily kept. Always have the grass-plot in the forecourt of the house, certainly ; but the use of grass at the back of the garden must be regulated by space and the desired presence of flowers and vegetables. Where both lawn and garden are wanted in limited space, grass paths are very useful ; but there is that about a grass path which causes much discontent and heart-ache on the part of the gardener—i.e. its rambling proclivity : it will not stay within its prescribed limits, and often breaks bounds, to the detriment of the borders it intersects. This fault necessitates the possession of an edging-tool and a small mower, and involves keeping the paths well clear of the garden. This last operation may be accomplished by cutting the edges of the path straight down to the depth of six inches or more, and making the garden ground to slope gently upwards away from the bottom

of the cut. This throws the path high and clear of the soil, and encroachment on the garden is then easily prevented. The path must be firm, level, and well mowed ; and only the finer, non-creeping grasses allowed in its make-up. Broad grass paths instead of a lawn, or in conjunction with it, add to the good appearance of large gardens.

I often wonder why lawns are not more planted with bulbs, etc., than they are. There is no other use for a lawn during the spring months, and the flowers of such bulbs as Scillas, Snowdrops, Crocuses, etc., will be well over by the time the grass must be cut, and the foliage of the bulbs can then be cut with it. Of course it is not beneficial to the bulbs to lose their foliage so early, but that is a minor consideration. The smaller and earlier-flowering varieties of Daffodils and Narcissi may be planted. In large areas many more plants could be introduced—Primroses, Polyanthus, and other spring bloomers. The effect of a lawn thus treated is indeed great.

Do not allow grass near the rockery, for here it is fatal. Once grass has secured a fair hold on the rockery its eradication probably means the pulling down and the consequent spoiling of the whole structure.

Pathways are necessary in every garden, but should not be made too narrow or too wide, out of proportion to the rest of the ground. Winding paths impart an appearance of larger extent, and so does a path that loses itself behind a tree or shrub. But these petty deceptions are not to be generally recommended.

Paths can be made up of gravel, sand, cinders, ballast, etc., or whatever material may be locally obtainable ; and tarred and cemented paths are very durable and clean : but all must be well drained. This draining can be accomplished by opening the ground to a good depth along the line of the pathway, and either laying a train of drain-pipes on the bottom of the trench, or putting a drainage foundation therein, composed of porous materials—broken bricks, stones, clinkers, sandstone, chalk ; and the stones picked from off the garden

may be utilized. On the top of this should be placed a layer of similar material broken into finer pieces ; then the sand, gravel, or whatever the surface is to be composed of. The whole must be rammed hard and firmly as the work proceeds. Lay the surface in arch form, so that the water drains away to the sides, leaving the middle of the path high and dry.

Weeds are often troublesome in pathways ; a strong solution of brine or carbolic acid will usually clear them away ; weed-killers or strong corrosive liquids may be used, but should be carefully kept from the garden.

Now I bring this volume to a close with a consciousness of its imperfections and the inadequate treatment of a prolific subject; but I have endeavoured to write plainly, and to avoid over-elaboration of language, so that all may comprehend. "Spade-Craft" is the effort of an amateur with no technical training, who has, by close observation, personal practice, and diligent study entered into profitable acquaintance with, and knowledge of, matters which are passed over by the average gardening amateur as too complicated and exacting to be pleasant. "Spade-Craft," although confirming the words of the text with which I began this book (which text really points out that no man can expect anything from the ground he has not troubled to cultivate intelligently ; and that spade-work is the only means by which a reward can be gained), will, I hope, encourage many an amateur or would-be gardener to enter into greater intimacy with fundamental facts and laws of lowly status, as well as the cleaner and more showy sides of garden operation.

INDEX

A

- Action of frost, etc., 6
- Agents, manurial, 11
 - mechanical, 16, 17, 18, 19, 20
- Air, chemically charged, 5, 23, 26
 - functions of, 5, 26
 - moist, 5, 25
 - provision of, 5, 6, 23
 - underground, 5, 23
 - versus water, 5, 26
- Alpine climate, 75, 76
 - flowers, 33, 34, 76, 77
 - garden, 75, 76
 - plants, 76, 77
 - — soils for, 75
 - seeds, 33, 34
- Angelica, 102
- Animals and weeds, 125
- Anise, 102
- Annual flowers, 28, 29, 30
 - weeds, 126
- Apples, 112, 113, 118
 - Application of lime, 6, 8, 9, 18, 19, 38, 72, 73, 79, 84, 90, 92, 93
 - of manures, 7, 11, 12, 13, 14, 15
 - of mechanical agents, 6, 16, 17, 18, 19, 20
- Apricots, 112, 114, 118
- Artichokes, 99, 101
- Artificial manures, 13, 14, 119
- Ashes, 17
- Asparagus, culinary, 99, 100
 - ornamental, 43
- Aspects for fruit trees, 107, 108
- Assisting Nature, 2
- Aubergine, 97

B

- Balm, 102
- Basil, 102
- Baskets, flower, 43

- Beans, Broad, 89
 - Dwarf, 90
 - Runner, 89, 90
 - uncommon, 90
- Bedding plants, 37
- Beds, flower, 53, 54, 55
 - for seedlings, 36, 37, 38
 - formal, 53
 - herb, 102
 - hot, 17
- Beetroot, 86, 87, 88
- Biennials, 30, 59
- Blackberries, 117
- Borage, 102
- Boxes, for Alpines, 33, 34
 - for seedlings, 36, 37
 - for seeds, 28, 30, 32
 - window, 43
- Broad Beans, 89
- Broccoli, 87, 93, 94
- Brussels Sprouts, 93
- Builder's rubbish, 9
- Bulbs, autumn-flowering, 62
 - classification of, 60, 61, 62
 - flowers from, 60
 - in grass, 62, 129
 - in pots, 62
 - Lily, 61
 - manure for, 60, 61, 62
 - soil for, 60, 61, 62

C

- Cabbages, 92, 93, 94
- Campanulas, 30, 43, 55, 56, 64, 76
- Capsicum, 102
- Cardoon, 95
- Carnations, layering, 50, 51
- Caraway, 102, 105
- Carrots, 86, 87, 88
- Cauliflowers, 94
- Celeriac, 88

- Celery, 94, 95
- Chemicals, dormant, 7
- Cherries, 69, 112
- Chervil, 88, 102, 105
- Chicory, 101
- Chives, 101, 103
- Clary, 103
- Classification of bulbs, 60, 61, 62
 - of flowers, 58, 59, 60, 61, 62, 63, 64, 65, 66
 - of fruits, 113, 114, 115, 116, 117
 - of herbs, 102, 103, 104, 105
 - of vegetables, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98
- Clay soil, 5
- Clematises, 67
- Climbing plants, disposition of, 67, 68
 - — foliaged, 68
 - — function of, 67
 - — planting, 67
 - — Roses as, 68
 - — soil for, 67
- Cloches, 47, 48
- Cobæa, 45, 67
- Coleworts, 93
- Composition of soil, 4
- Composts, 38
- Coriander, 103
- Cucumbers, 97, 98
- Cultivating the soil, 12, 19, 24
- Cultivation of annual plants, 28, 29, 30
 - of Angelica, 102
 - of Anise, 102
 - of Apples, 102, 113, 118
 - of Apricots, 112, 114, 118
 - of Artichokes, 99
 - of Asparagus, 43, 99, 100
 - of Balm, 102
 - of Basil, 102
 - of Beans, 89, 90
 - of Beetroot, 86, 87, 88
 - of biennials, 30, 59
 - of Blackberries, 117
 - of Borage, 102
 - of Broccoli, 87, 93, 94
 - of Bulbs, 60, 61, 62
 - of Burnet, 102
 - of Cabbages, 92, 93, 94
 - of Campanulas, 30, 43, 55, 56, 64, 76
 - of Capsicum, 102
- Cultivation of Cardoon, 95
 - of Carnations, 50, 51
 - of Caraway, 102, 105
 - of Carrots, 86, 87, 88
 - of Cauliflowers, 94
 - of Celery, 94, 95
 - of Cherries, 112, 114
 - of Chervil, 102, 105
 - of Chives, 103
 - of Clary, 103
 - of climbers, 67, 68
 - of Coriander, 103
 - of Currants, 112, 115, 116
 - of Dandelions, 103
 - of deep-rooting plants, 59, 61, 62, 63, 65
 - of Dill, 103
 - of evergreens, 68, 69, 70, 71
 - of Fennel, 103
 - of Ferns, 45
 - of Figs, 112, 115
 - of foliage plants, 45
 - of fruit, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118
 - of Gooseberries, 112, 115
 - of Gourds, 98, 99
 - of half-hardy plants, 31, 60
 - of hardy plants, 29, 30, 31, 55, 56, 58, 59, 60, 61, 62, 63, 64, 65
 - of Herbs, 101, 102, 103, 104, 105
 - of Hops, 103
 - of Horehound, 103
 - of Horseradish, 103
 - of Hyssop, 103
 - of Lavender, 103
 - of Leeks, 95
 - of Lettuce, 101
 - of Loganberries, 112, 117
 - of Marigold, 103
 - of Marjoram, 103
 - of Melons, 98
 - of Mint, 103
 - of Mulberries, 117
 - of Nectarines, 114, 118
 - of Nuts, 117
 - of Onions, 84, 85, 86
 - of Parsley, 103, 104, 105
 - of Parsnips, 86, 87
 - of Peaches, 112, 114, 118
 - of Pears, 112, 113, 114, 118
 - of Peas, culinary, 90, 91, 92
 - — perennial, 54, 71
 - — Sweet, 55, 63, 71

Cultivation of perennial plants, 30,
 — 53, 54, 55, 56, 57, 58, 59, 60
 — of Plums, 112, 114, 118
 — of Potatoes, 82, 83, 84
 — of Pumpkins, 98
 — of Purslane, 104
 — of Quinces, 102, 117
 — of Radishes, 101
 — of Rampion, 104, 105
 — of Raspberries, 112, 116
 — of Rhubarb, 104
 — of rockery plants, 72, 73, 74, 75,
 76, 77
 — of roots, tender, 56, 57, 58, 59, 60
 — of roots, uncommon, 95, 105
 — of Rosemary, 103
 — of Roses, 50, 51, 52, 55, 59, 62,
 63, 64, 68, 70, 71
 — of Rue, 104
 — of Sage, 105
 — of Salads, 101
 — of Salsify and Scorzonera, 105
 — of Savory, 104
 — of Seakale, 100
 — of Shallots, 85
 — of slow-growing plants, 32, 33
 — of Spinach, 99
 — of Strawberries, 117
 — of Strawberry-Raspberry, 117
 — of surface-rooting plants, 60
 — of Tansy, 105
 — of Tarragon, 105
 — of tender plants, 32, 56, 57, 58,
 59
 — of Thyme, 104
 — of Tomatoes, 96, 97
 — of tuberous plants, 54, 60
 — of Vegetable Marrows, 98
 — of Woodruff, 105
 — of Wormwood, 105

D

Dandelions, 103
 Deep digging, 24, 26
 Deep-rooting plants, 59, 61, 62, 63,
 65, 72, 73, 74, 75, 76, 77, 84, 85,
 86, 87, 89, 90, 91
 Deep soils, 4, 5, 6, 7, 8, 9
 Dill, 103
 Diseases, 12, 122
 Disposal of garden refuse, 15, 78, 79
 — of water, 21, 22, 23, 24, 25, 26
 Drainage, 5, 23, 24, 25, 26
 Drought, 22

E

Edgings, floral, 64
 — of Campanulas, 64
 — of Forget-me-nots, 64
 — of various flowers, 64
 — spring, 64
 Egg Plants, 97
 Evergreens as ornamental shrubs,
 69
 — cultivation of, 69
 — hedges of, 68, 70
 — in adversity, 69
 — manure for, 69
 — pruning, 71
 — Roses as, 68
 — treatment of, 69
 — water for, 69

F

Favourite flowers, a few notes on,
 62, 63, 64
 Fernery, the, 74
 Ferns, 45, 54, 74
 Fibre, 19
 Figs, 112, 115
 Floral edgings, 64
 Flowers, annual, 30
 — autumn-flowering, 60, 61, 62
 — biennial, 30, 59
 — cultivation of, 53, 54, 55, 56, 57,
 58, 59, 60, 61, 62, 63, 64, 65, 66
 — cutting, 55, 56
 — deep-rooting, 59
 — disposition of, 53, 54, 55
 — fibrous-rooted, 54, 60
 — for dry, hot positions, 54
 — for cool, moist positions, 54, 59,
 73, 74
 — for greenhouse, 44, 45, 46
 — for hothouse, 46
 — for window gardening, 43
 — formal beds of, 53
 — from bulbs, 60, 61, 62
 — half-hardy, 31, 60
 — management of, 55
 — manures for, 13, 14, 20
 — perennial, 30, 53, 54, 55, 56, 57,
 58, 59, 60, 61, 62, 63, 64, 65, 66
 — planting, 53, 55
 — protection for, 56, 57, 58
 — roots of, 54
 — second crops of, 56

- Flowers, slow-growing, 32, 33**
 - soils for, 54, 55, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66
 - spring-flowering, 60, 61
 - staking, 56
 - stem-rooted, 54, 60
 - summer-flowering, 60, 61
 - surface-rooting, 60
 - tap-rooted, 54, 59
 - tender, 32, 56, 57, 58, 59
 - tuberous-rooted, 54, 60
- Foliage plants, 45**
- Following instructions, 3**
- Forcing Nature, 2**
- Frames, cold, 47**
 - home-made, 37
 - hotbed for, 47
 - plants for, 47
 - soil for, 47
- Fruit, cultivation of, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118**
 - gathering, 111
 - list of varieties of, 113, 114, 115, 116, 117
 - storing, 111
 - thinning, 111
 - trees, aspects for, 107
 - drainage for, 106, 107
 - espalier, 111, 112
 - manures for, 106, 107
 - old, 110, 111
 - ornamental, 69, 70
 - planting, 108, 109
 - pruning, 109, 110
 - root-pruning, 110, 111
 - sites for, 107
 - soils for, 106, 107
 - staking, 109
 - standard, 69
 - treatment of, 109
 - uncommon, 69, 70
 - useless, 111
 - watering, 109
 - young, 109
 - Functions of air and water, 5

G

- Garden, a new, 9**
 - an ideal, 1
 - the Alpine, 75, 76
- Gardener's intelligence, 3**
 - means, 2

- Garlic, 85**
- Gathering fruit, 111**
- Gooseberries, 112, 115**
- Gourds, 98, 99**
- Grass and rockery, 129**
 - and weeds, 126
 - bulbs in, 129
 - paths, 128, 129
- Greenhouse climbers, 45**
 - flowers, 44, 45, 46, 47, 48
 - fruits, 118
 - management, 44, 45, 46, 47, 48
 - moisture, 45
 - soils, 45
 - temperatures, 46, 47
 - vegetables, 96, 97, 98
 - ventilation, 46, 47

H

- Half-hardy plants, 31, 60**
- Hardy plants, 29, 30, 31, 55, 56, 58, 59, 60, 61, 62, 63, 64, 65**
- Heavy soils, 5, 6**
- Hedges, 68, 70, 71**
- Herbs, 101, 102, 103, 104, 105**
- Hoeing, 10**
- Hops, 103**
- Horehound, 103**
- Horseradish, 103**
- Hotbeds, 47**
- Hothouse, 46**
- House plants, 40, 41, 42**
- Humus, 16, 78, 79, 91**
- Hyssop, 103**

I

- Ideal garden, the, 1**
- Illustration, an, 24, 25**
- Insect-trapping, 120**
- Insecticides, 119, 120, 121, 122**
- Insects, 18, 19, 28, 119, 120, 121, 122**
 - and poultry, 120, 121
 - and weeds, 122
 - small, 121
- Instructions, following, 3**
- Intelligence, the gardener's, 3**

K

- Kales, 93**
- Khol-Rabi, 88**
- Kidney Beans, 90**

- L
- Lavender, 103
 - Lawn, the, 128, 129
 - Layering Carnations, 50
 - Roses, 50
 - Leeks, 95,
 - Lettuces, 10
 - Lime, 6, 8, 9, 18, 19, 38, 72, 73, 79, 84, 90, 92, 93, 119, 120
 - List of fruits, 113, 114, 115, 116, 117
 - of herbs, 102, 103, 104, 105
 - Loganberries, 112, 117
- M
- Manures, application of, 11, 12, 13, 14
 - artificial, 13, 14
 - for flowers, 13, 14, 20
 - for fruits, 106, 107
 - for subsoil, 13, 18
 - for vegetables, 11, 12, 13, 14, 15, 28, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96
 - liquid, 13, 20
 - locked-up, 7
 - organic, 13, 14
 - powerful, 13
 - rank, 13
 - uses of, 13, 14
 - Manorial balance, 11
 - surfeit, 11
 - treatment, 11
 - Marigold, 103
 - Marjoram, 103
 - Marrows, Vegetable, 98
 - Means, the gardener's, 2
 - Mechanical agents, 16, 17, 18, 19, 20
 - Meconopsis, 59
 - Melons, 98
 - Mint, 103
 - Moderation, the need of, 1
 - Moisture, provision of, 21, 22
 - Mulberries, 117
 - Mulch, the, 16, 22, 60, 78, 85, 96
- N
- Native flowers, 55, 56
 - Nature, Alpine, 75
 - assisting, 2
 - forcing, 2
 - limits of, 2
 - Nectarines, 114, 118
 - Need of moderation, the, 2
- O
- Need of study, the, 2
 - Needs of the soil, the, 2
 - New garden, a, 9
 - Nuts, 117
- P
- Onions, 84, 85, 86
 - Ornamental gourds, 99
 - plants, 68, 70
 - shrubs, 69, 70
 - standards, 69
 - Pansies, 63
 - Parsley, 88, 103, 104
 - Paths, 128, 129, 130
 - Pears, 69, 112, 113, 114
 - Peas, culinary, 90, 91, 92
 - Everlasting, 54, 71
 - Sweet, 55, 63, 71
 - Perennial flowers, 30
 - herbs, 102, 103, 104, 105
 - seedlings, 30
 - seeds, 30
 - Perennials, glasshouse, 45, 46
 - hardy, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71
 - manure for, 2
 - soil for, 30
 - tender, 41, 42, 44, 48, 56, 57, 58, 59, 60
 - transplanting, 30, 37
 - Plants, Alpine, 33, 34
 - annual, 30
 - biennial, 30
 - climbing, 67
 - damage to, 56
 - flowering, 56
 - foliage, 45
 - food sources of, 5
 - for bedding, 37
 - for greenhouse, 44, 45, 46, 47
 - for hothouse, 44, 45, 46
 - for pots, 36, 39, 41, 42, 43
 - for window gardening, 43
 - half-hardy, 31, 56, 57
 - house, 40, 41
 - layering, 50, 51, 52
 - manures for, 13, 14
 - ornamental, 56
 - perennial, 30
 - reproduction of, 56
 - slow-growing, 32, 33
 - soils for, 31, 32, 38, 39, 41, 42, 45, 46, 56, 57

- Plants, specimen, 36, 42, 43
 — staking, 56
 Plums, 69, 112, 114, 118
 Poppies, 55, 59, 63, 64
 Pot Marigold, 103
 Pot plants, 36, 39, 41, 42, 43
 Potatoes, 82, 83, 84
 Potting, 19, 39, 40, 41, 42, 43
 — drainage for, 39
 — materials for, 39, 40
 — method of, 40
 — soil for, 39
 Poultry, 120, 121
 Propagation by cuttings, 50, 51
 — by layers, 51, 52
 — by pipings, 51
 — by slips, 51
 Propagator, the, 48
 Pruning climbers, 67
 — fruit trees, 109, 110, 111
 — rose trees, 62, 63
 — shrubs, 69, 70, 71
 Pumpkins, 98
- Q
- Quinces, 112, 117
- R
- Radishes, 101
 Rain-water, 25, 26
 Rampion, 104
 Raspberries, 112, 116
 Rhubarb, 104
 Road scrapings, 16, 51
 Rockery, the, 72, 73, 74, 75, 76, 77
 Roots, bulbous, 60, 61, 62
 — damaged, 55
 — fibrous, 54, 60
 — tap-, 59, 86, 106, 107, 110, 111
 — tender, 56, 57
 — tuberous, 54, 60
 Rosemary, 103
 Roses, 50, 51, 52, 55, 59, 62, 63,
 64, 68, 70, 71
 Rue, 104
- S
- Sage, 104
 Salads, 101
 Salsify, 105
 Salt, 9
 Sand, 20
 Savory, 104
- Savoys, 93
 Scallions, 85
 Scorzonera, 105
 Scrapings, road, 16, 51
 Seakale, 100
 Second crops of flowers, 56
 Seedlings, annual, 29
 — biennial, 32
 — half-hardy and tender, 31, 32
 — in boxes, 36
 — in frames, 36
 — in open-air, 36
 — perennial, 30
 — potting, 39, 40
 — transplanting, 29, 30, 36, 37
 — under glass, 36
 Seeds, Alpine, 33, 34
 — annual, 28
 — biennial, 31
 — conditions for sowing, 33
 — for autumn-sowing, 29
 — gathering, 37
 — herb, 105
 — perennial, 30
 — slowly-germinating, 32, 33
 — soils for, 27, 28, 29, 33
 — sowing, 46
 — staleness of, 34, 35
 — vegetable, 82
 Shallots, 85
 Shrubs, cultivation of, 69, 70
 — flowering, 70
 Sites for trees, 70
 Skirrett, 104
 Slips, 50
 Slow-growing plants, 32, 33
 Slowly-germinating seeds, 32, 33
 Soil, action of frost, etc., upon, 6
 — composition of, 4
 — cultivating the, 9, 24
 — digging the, 24, 26
 — dormant chemicals in the, 7
 — draining the, 5, 23, 24, 25, 26
 — for Alpines, 75
 — for ferns, 45
 — for frames, 47
 — for fruit, 106, 107, 108
 — for glasshouses, 45, 46
 — for house plants, 41, 42
 — for layering, 50, 51, 52
 — for potting, 39
 — for tender plants, 31, 32, 56, 57
 — good, 8
 — heavy, 5

Soil, light, 7
 — manuring the, 7
 — needs of, 2
 — sick, 8
 — special, 37, 38
 — temperature of, 23, 25
 — testing the, 8
 — texture of, 23
 — trenching, 7, 8
 Soot, 9, 19
 Sorrel, 104
 Specimen plants, 36, 42, 43
 Spinach, 99
 Spring-flowering plants, 60, 61
 Staking, 56, 108, 109
 Standard trees, 69, 70, 109
 Storing fruit, 111
 Strawberries, 117
 Strawberry-Raspberry, 117
 Striking, 52
 Study, the need of, 2
 Subsoil manuring, 13, 18
 Summer-flowering bulbs, 61
 Surface-rooting flowers, 60
 Sweet Peas, 55, 63, 71

T

Tansy, 105
 Tap-roots, 54, 59, 86, 105, 106, 107,
 110
 Tarragon, 105
 Temperature of soil, 23, 25
 — of glasshouses, 46, 47
 — for sowing seeds, 33
 Tender plants, 31, 32, 56, 57
 — roots, 56, 57
 Testing the soil, 8
 Texture of the soil, 23
 Thinning fruit, 111
 Thyme, 104
 Tomatoes, 96, 97
 Transplanting, 29, 30, 36, 37
 Trees, espalier, 111, 112
 — fruit, 106, 107, 108, 109, 110,
 111, 112, 113
 — ornamental, 69, 70
 — sites for, 70
 — standard, 69, 70
 Trenching the soil, 7, 8
 Tuberous plants, 54, 60

U

Underground air, 5, 23
 Useless trees, 111

V

Vegetable Marrows, 98
 Vegetables, cultivation of, 78, 79,
 80, 81, 82, 83, 84, 85, 86, 87, 88,
 89, 90, 91, 92, 93, 94, 95, 96
 — drainage for, 78, 79, 80, 81, 83,
 84, 90, 96
 — grown in trenches, 94, 95
 — — on ridges, 86, 87
 — — under glass, 85, 89, 96
 — humus for, 78, 79, 91
 — large-sized, 81, 82
 — leguminous, 89, 90
 — lifting, 87
 — manures for, 11, 12, 13, 14, 15,
 78, 79, 80, 81, 82, 83, 84, 85, 86,
 87, 88, 89, 90, 91, 92, 93, 94,
 95, 96
 — rotation of, 79, 80
 — soils for, 4, 5, 6, 7, 8, 9, 10, 78,
 79, 80, 81, 82, 83, 84, 85, 86,
 87, 88, 89, 90, 91, 92, 93, 94,
 95, 96
 — sowing seeds of, 82, 85, 88, 89,
 92, 93, 95
 — tap-rooted, 86, 87, 105
 — thinning seedlings of, 82, 85, 92,
 95
 — transplanting, 85, 92, 94, 95
 — turnip-rooted, 87, 88, 89
 — uncommon, 88, 90, 93, 105
 — watering, 78, 87, 90, 94, 96

W

Water, application of, 21, 22
 — disposal of, 21, 22, 23, 24, 25,
 26
 — functions of, 5
 — lime-, 19
 — manure-, 13, 14
 — rain-, 25, 26
 — science of, 5, 21, 22, 23, 24, 25,
 26
 — soot-, 9, 19
 Watering, 16, 17, 23, 24, 25, 26
 Weeds, 112, 123, 124, 125, 126,
 127, 130
 Window gardening, 43
 Woodruff, 105
 Wormwood, 105

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	PAGE
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Handbooks of English Church History	16
Handbooks of Theology	16
'Home Life' Series	16
Illustrated Pocket Library of Plain and Coloured Books	16
Leaders of Religion	17
Library of Devotion	17
Little Books on Art	18
Little Galleries	18
Little Guides	18
Little Library	19
Little Quarto Shakespeare	20
Miniature Library	20
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New Library of Music	21
Oxford Biographies	21
Four Plays	21
States of Italy	21
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Shilling Library	22
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